MACHINE

BIJIE ESTABLISHED 1906 BIJIE B

and TOOL

OCTOBER 1952

The Factor

Box Strapping vs. Priction Jaw Glass

More About Cool Crinding

New Monthly Fostures

The Book Wilney Hour Reference Shook

Special Report on Drilling Machine

Complete Contents on Page 5

Only MARVEL builds all four*

While it is true there are several builders of hack sawing machines and many builders of band sawing machines, only MARVEL builds BOTH hack saws and band saws. The fact is that MARVEL manufacturers 35 models of 10 basic types of metal sawing machines which include the world's fastest automatic production saw, the world's largest giant hydraulic hack saws, the world's most versatile band saw and the most widely used small shop saws.

With intimate and broad field experience in all types of metal cutting off equipment and 35 different saws available, it is obvious that MARVEL Field Engineers occupy a unique and in the industry. They exclusive position eminently qualified to make expert and unbiosed recommendations covering the type, size and model of metal sawing equipment best suited to individual requirements—the most efficient, most accurate, fastest, broadest in scope and the most economical.

MARVEL is also the only manufacturer of both metal sawing machines and metal sawing blades. efficiencies of both the machine Because the and the blades are interdependent, each upon the capability of the other, expert knowledge covering both saws and saw blades is essential to the proper appraisal of any specific sawing situation. Correct balance of cutting speed and blade life, feed pressure and blade tension are all potent factors in over-all performance. Here again it is the MARVEL Field Engineer who is qualified to provide the comprehensive answer to your question. His job is to help you saw metal most efficiently—his services are available upon request-gratis.

Write for Catalog 49

ARMSTRONG-BLUM MFG. CO.

5700 Bloomingdale Ave., Chicago 39, U.S.A.

9A Marvel Hack Saw MARVEL Metal-Cutting MARVEL High-Speed-Edge HACK SAW BLADE

*HACK SAWING MACHINES

*BAND SAWING MACHINES

*BAND SAW BLADES

*HACK SAW BLADES



New · Fast · Proven

methods for PERFORATING and NOTCHING SHEET METALS

Whistler MAGNETIC Dies

at work in large inclinable press. Magnetized retainers hold the units. No bolting required. A fast, economical method in making up a punch and die set for short or long runs. All parts re-usable.

Whistler ADJUSTABLE Dies

on perforating and notching job, using Tee slotted die set. With Whistler Adjustable Punch and Die units production starts within hours instead of weeks. Last minute job changes made quickly.

REDUCE DIE COSTS

All units and parts are interchangeable and used repeatedly in different arrangements. INCREASE PRESS PRODUCTION—Down time is minutes as compared to hours for changeover. For precision work in all types and sizes of presses. START PRODUCTION AT ONCE. Pierce materials up to ¼" thick mild steel. Standard sizes and shapes available up to 3 inches. Special sizes to order.





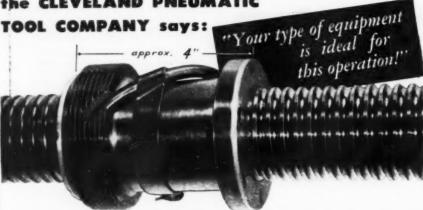


Adjustable, Magnetic, Custom and Cam Dies for all Industry
760 Military Road, Buffalo 23, N. Y.

October, 1952

.

the CLEVELAND PNEUMATIC



This ball bearing screw and nut is a special type of actuator for operating the landing flaps of airplanes. In pointing out the part that the Wade Precision Profiler played in the machining of these actuator screws, Mr. John A. Hope, Manager of the Actuator Division of the Cleveland Pneumatic Tool Company wrote as follows:

"These ball bearing screws were used in a development program on the Boeing B-29 flap system, and from these tests it was proved that our unit had considerable possibilities in this field . . . you will note the return tube, in order to get the most effective length of engagement, is recessed into the V-thread on the nut. Your type of equipment is ideal for this operation."



is heavy, rugged, compact. Eight different speeds, powerful V-ball drive. Has new cutter older cultets, with improved grip. A fellower idle parallel to the main spindle holds a cutter for producing templates from samples.

The Wade Precision Profiler is a versatile machine needed by every metal working step, large or small. If performs precision recessing, stating, milling, reuting, and hand profiling approximate forth, more efficiently, and more excenamically than by any other method. The working area on the fable is $3^{11}_{11} = 3^{11}_{12} = 3^{11}_{13}$, and there is a removable father block of that size.



write for descriptive folder and prices

MAKERS OF PRECISION TOOLS FOR AMERICAN INDUSTRY

51 RIVER STREET



When a set of gears runs quietly and smoothly you can OK them for assembly with the assurance they will function properly in service. Such a test under varying speeds can be made easily and quickly by the average shop man.

If the sound test reveals objectionable noise the faulty gears are immediately routed back for correction. You won't waste time and expense by assembling them.

When you have a set of gears in the Sound Tester you can also check tooth bearing. Just use marking compound on one and observe its transfer to the mating gear. When the sound test reveals a nicked tooth the nick may be removed by a pencil grinder while the gear is still in the sound testing machine.

Special sound testing machines are available to meet individual requirements.





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ARMSTRONG TOOL HOLDERS reduce "tooling-up" to the selection of a cutter and tightening of a set screw They permit oper-

ation at higher speeds, and heavier feeds than are customary—they enable you to produce more pieces per hour, per man, per machine.

more pieces per hour, per man, per machine.

Produced by modern methods, in a specially-built tool plant, they are the lowest cost tooling you can buy. And, they are as available as your telephone for they are carried in stock by your local supply house.

Use ARMSTRONG TOOL HOLDERS

Use ARMSTRONG TOOL HOLDERS wherever possible for lower tool cost, saving in High Speed Steel, increased output and greater profit. Write for Catalog



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you can even feel them make time

You can tell by the quiet smooth operation of these C-O Cincinnati 16"-3000 drills that they're really built for accurate work, long hours, and consistently high earnings. High production . . . freedom from vibration and chatter . . . plus the "feel" of a fine tool are the end result of the extra features that make these drills "of outstanding value." And remember, this is just one of many machines available in the complete C-O Cincinnati line to meet all your drilling requirements.

Accurate, alloy steel spindle, mounted in a ground steel quill between permanently sealed high-grade ball bearings. Capacities up to l" in cast iron.

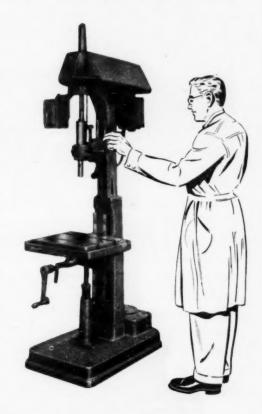
Full floating drive transfers all belt pull to two additional ball bearings in the spindle pulley.

Hand-scraped head ways cost integrally with the frame provide rigid support for the head. (Counterweight concealed in frame.)

Tilting motor bracket permits easy belt shifting for speed changes without wrenches; helps maintain proper belt tension.

Positive, speedy spindle return is adjustable to changing job requirements.

Write for Catalog D-108 and the name of your dealer.





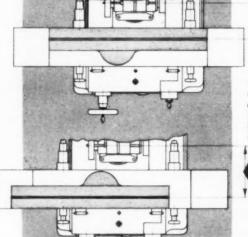
CANEDY-OTTO DIVISION

CINCINNATI 9, OHIO, U.S.A. cincinnati lathe & tool co.

October, 1952

NEED MORE RANGE to grind your

larger



A

3½" increase in the normal maximum cross range of the machine is gained when the table is swiveled 180°. (Reading from drawing A to B)



B



Heavy Duty Tailstocks and extra long table traverse equip this CIN-CINNATI No. 2 Cutter and Tool Grinder for extra large work.

CIN

CINCINNATI No. 2 Cutter and Tool Grinder. Complete information may be obtained by writing for catalog No. M-1734.

cutters?

In the average shop most cutters are ground on a No. 2 size machine. But the inevitable always happens; sooner or later a cutter shows up that requires more range than available. ¶If you have CINCINNATI No. 2 Cutter and Tool Grinders in your shop,

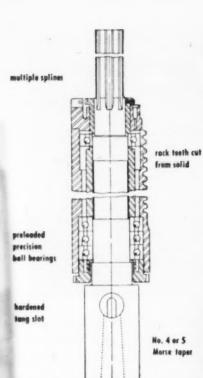


here's a way to get greater cross range that may have escaped your attention: just swivel the table 180°. It's like this—the table is pivoted 1¾" off center from the T-slot, and when it's swiveled 180°, 3½" is gained in the maximum dimension from the T-slot to the center of the grinding wheel spindle (see drawing). ¶The way to obtain increased table traverse and/or swing is to specify it when you order the machine. CINCINNATI No. 2 Cutter and Tool Grinders may be equipped with 36" table travel and heavy duty tailstocks for 16" diameter swing. ¶Many other advantages are offered by these machines. All are outlined in a new, profusely illustrated catalog, No. M-1734. A copy is yours for the asking.

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CINNATI

MILLING MACHINES • CUTTER SHARPENING MACHINES • BROACHING MACHINES • METAL FORMING MACHINES • FLAME HARDENING MACHINES • OPTICAL PROJECTION PROFILE GRINDERS • CUTTING FLUID



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Job after job, Cincinnati Gilbert spindles stay right on "O". The 41/4" OD alloy steel quill has a 12" long bearing in the head; spindle is mounted in the quill with three ABEC No. 5 precision, preloaded angular contact ball bearings at the bottom and one at the top. The Gilbert spindle gives maximum accuracy even under strains of improperly sharpened drills, uneven depths of cut, as well as normal thrust load of feeding . . . For sustained accuracy, make your next radial a Cincinnati Gilbert. Write for Bulletin 349.

FLEXIBLE



In the photo at the right the operator drills and taps a total of 35 holes, on five faces of the casting, by using a Cincinnati Gilbert Universal Table.

RADIALS HORIZONTAL BORING MILLS ACCESSORIES

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Write for Cincinnati Shear Catalog S-6 and Cincinnati Press Brake Catalog B-3.

Photos-Courtery Fireher Steal Corp., Momphie, Tonn.

CINCINNATI

Worth Looking Into!

APEX friction chucks

Wherever the tool is subject to breakage, that's the spot for an Apex Friction Chuck. Merely turn the adjusting nut to secure the proper tension and the friction will slip just before the breaking point of the tool is reached. End thrust from tapping or drilling, or presure exerted on the spindle will not affect tension setting. Setting maintained for extended periods without requiring readjustment. Safe and simple to operate, Apex Friction Chucks will reduce tool breakage. Used on reversible drill presses, radials, hand screw machines, all makes of tapping devices, and with air or electric tools.

... and APEX sockets for tap driving

For re-tapping or cleaning damaged or clogged tapped holes. Set screw holds tap firmly in hex or female square socket. Quickly and easily attached to power tool. Saves time on assembly and production lines by enabling operator to re-tap damaged holes, or clean holes plugged with paint, gook or similar materials.

Get all the facts about all Apex production tools . . . write, on your company letterhead please, for your copy of the new Catalog 114.

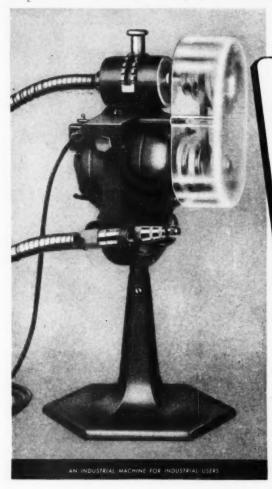




production tools

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October, 1952

AP-ODDITIES

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We know all the angles

WE was provided to the provided



ROM

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But—of one thing he is quite sure, He's going to vote this year!

VOTING BOOTH PRECINCT 19

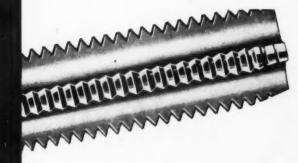


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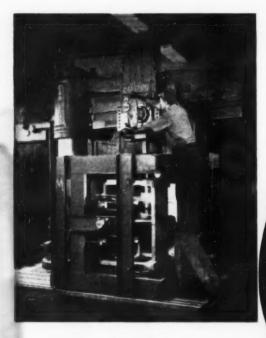
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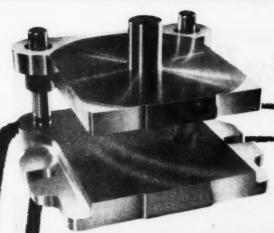
> "When compared to the ordinary drill, this huge Carlton radial (above) is gigantic and yet it is precise and accurate."

THAT PRECISION COMES FROM enlightened Carlton designing, engineering and manufacturing . . . and from an intimate knowledge of your radial drill requirements acquired in sixty years of experience.

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helped <u>FORD</u> retool for 52

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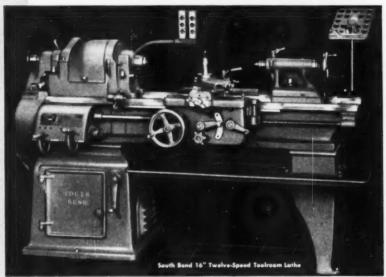
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Cuts Machining Time The wide range of spindle spends

The wide range of spindle speeds on this new lathe cuts machining time because the operator quickly selects the right speed for each operation. Pushbutton control provides a fast change from any high speed to the corresponding low speed. This versatility is further increased by 48 choices of longitud-

SOUTH BEND 12 SPEED LATHE

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PECIFICATIONS

Spindle Speeds (approx.) Direct: high range 300, 550, 945; low range 150, 278, 475. Back gear drive: high range 32, 70, 118; low range 20, 33, 60.

Spindle Bare — 13's". Swing over bed and saddle wings — 1614".

Swing over saddle cross slide - 95%".

Distance between centers - 331/4", 451/4", 571/4", 811/4", 1051/4".

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Longitudinal Feeds — 48 R.H. or L.H., .0015" to .0841".

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You know—it's really surprising how many difficult milling operations can easily be handled by Kempsmith Standard Attachments mounted on a standard milling machine.

Manufacturers faced with urgent production schedules are utilizing Kempsmith Standard Attachments to help solve their milling problems. These precision-built accessories are made to perform the most delicate milling operations, with speed and accuracy. They frequently eliminate the need for special, single-purpose machines, at the same time reducing production costs to rock bottom.

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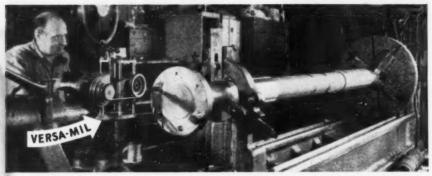
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6 holes drilled, bored, and spot faced in forged steel flange of propeller tail shaft at Rodermond Industries, Jersey City. Finished holes 2.000'' + .001'' - .000''. Cut shows third operation: $1\frac{34}{6}$ drill power fed 1" per minute into $1\frac{7}{6}$ hole.

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The Tool for Precision Milling, Boring and Grinding

GIVES YOU EXTRA MACHINE TOOL CAPACITY PROMPTLY

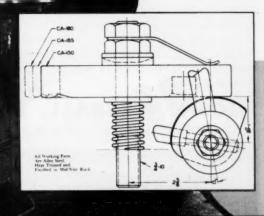
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When confronted with a problem considered impossible by the experts, Mr. Andrew C. Dickson, General Superintendent of Mfg., Detroit Tank Arsenal, and Staff, together with the "Know-How" of Colonial Broach Engineering Staff solved it, resulting in a \$400 a day saving. Fully described in March 3 issue of American Machinist.

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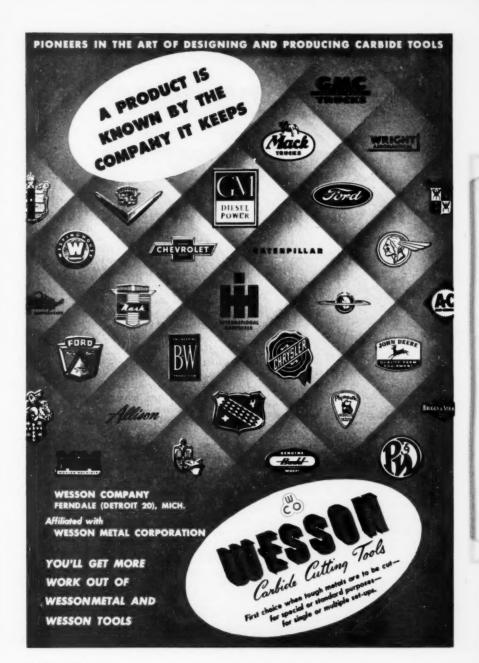


tions. The special products which frame the chart are a constant reminder of a good source of coldheaded parts.

JOHN HASSALL,

411 OAKLAND STREET . BROOKLYN 22, N. Y.





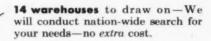
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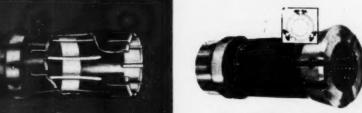
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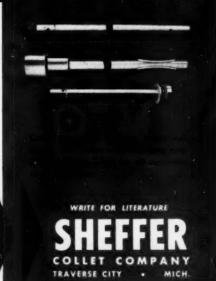
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Non-galling materials provide a selfhoning action that prevents looks and increases valve life.

SIMPLE CONSTRUCTION No disks or packings to fail and start leaks. Basic design assures positive seal and long life.

5reasons why your air lines should have PRESSURE SEATED AIR VALVES

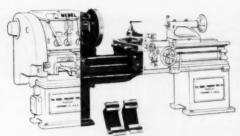
Cleco Air Valves pay for themselves over and over again in the air they save. Furthermore, by delivering full air pressure to the tools, they increase production.

Cleco Air Valves are made in four styles and in all sizes from 1/4" to 1". Write for full information, including the name of your nearest dealer.

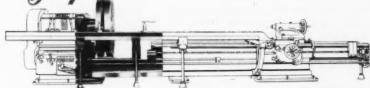


CLECO DIVISION

of the REED ROLLER BIT COMPANY 5125 CLINTON DRIVE **HOUSTON 20. TEXAS**



the gaps in our line



fill a need in



your plant!

If you have a variety of big, bulky, odd-shaped pieces to turn regularly, you need a Nebel gap lathe. Either a removable block gap or an extension bed gap. Depends on your individual requirements. Your Nebel distributor, located conveniently close to you, will be glad to help you decide which is better. Why not phone him now?

THE NEBEL MACHINE TOOL CO., CINCINNATI 25, ORIO, U. S. A.

fine lathes at modest cost since 1899

write for free bulletins!





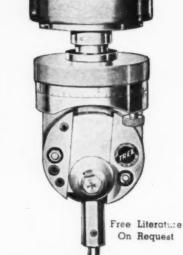
Cut expensive set-up time from hours to a few minutes with the revolutionary TREE taper boring tool. You can use it on your present milling machine, jig borer or boring bar. Write today for complete information. In addition to boring taper holes this tool can be used for-



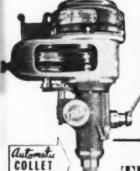
- Straight boring . . . as shown at left used as offset boring tool.
- Facing . . . up to 10" in -diameter.

CLOSER

· Outside Turning . . . either straight or tapered up to 8" with extension bar.







HEAD ATTACHMENT HEAD ATTACHMENT . . .

All Angle Milling, Drilling & Boring. Compact Design, 3/4" Collet Capacity. 4" Quill Travel. Power Feed Eight Speeds-140-3500 RPM or 210-5200 R.P.M. Hardened & Ground Spindle & Quill. Enclosed Micrometer. Depth Stop.

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For Sureness of Hand and Precision of Aim

According to legend, the Swiss Hero, William Tell, refused to bow before a tyrant and consequently was ordered to shoot an apple off his own son's head. His courage and precise aim led to his undying fame and the later freedom of his country.

OLIVER DIE MAKING MACHINES Famed for Precision Increase Tool Room Efficiency

For almost 40 years, thousands of plants throughout the world have increased their toolroom efficiency with Oliver Die Makers for sawing, filing and lapping operations. The faster and more accurate Oliver Method for die making effects savings in time and costs up to 60%. Proof of their efficiency and dependability is substantiated by the fact that many Oliver Die Making Machines have been in continuous use for more than 25 years. Olivers offer the added attraction of being so simple to operate that skilled labor is not required. Find out for yourself . . . BE WISE, OLIVERize.

OLIVER DIE MAKERS Available in 5 Models

The Bench Model S-1 (illustrated) is a single speed die maker for use on tool steel up to 1" thick.

The Heavy Duty Model (illustrated) has 6 speeds, works in metal up to 3" thick, has variable strokes to 5" with hydraulic feed.

Write Today For Complete Technical Data on OLIVER DIE MAKERS



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1408 E. MAUMEE . ADRIAN, MICHIGAN

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Only low cost quill travel attachment.

High speed medium-light operation.

For bench, floor and pedestal mills.

Fits milling machines with overarm 1½" to 3"

%" end mill capacity.

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HEAVY DUTY MILLING ATTACHMENT



3/4" end mill capacity.

For vertical, horizontal and angular operations.





RUSNOK TOOL HOLDERS

For square turret post on turret lathes and lathes.
Slashes costs on cutting tools.

Uses standard 1/2" tools.

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GISHOLT'S easier operation

saves you time and money . . .

This 21,000 lb. machine requires no more operating effort than turret lathes ½ its weight. Despite its great power and rigidity for heavy-duty work, the new Gisholt 4-L is so fast and responsive, it can handle light work of both large and small diameters. With many machine functions entirely automatic, waste time is eliminated. Fatigue is reduced to a new minimum. Training time is shortened. Operator output is faster—more nearly constant throughout the day.

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Central control panel eliminates manual effort. Provides responsive finger-tip, push-button control for start, stop, reverse, inching, chucking, and coolant supply. Automatic braking brings the work smoothly and quickly to rest.

Easy selection of feeds is provided in the new single dial type feed selector control, making a complete choice of feeds immediately available. Aprons are fully enclosed. Automatic lubrication assures easy movement of carriage.

The new Gisholt 4-L Saddle Type Turret Lathe provides 31\%" swing over the ways, 27" swing over carriage wing, 9\\(\frac{1}{2}\)" to 12\\(\frac{1}{2}\)" spindle bores and 63" longitudinal working travel of turret carriage to accommodate an unusually wide range of work. Ask Gisholt engineers about this modern, easier operating Gisholt as applied to your specific machining requirements. New literature is available.

GISHOLT.



10. Wisconsin

THE GISHOLT ROUND TABLE represents the collective experience of specialists in the machining, surface-finishing and balancing of round and partly round parts. Your problems are welcomed here.

TURRET LATHES . AUTOMATIC LATHES . SUPERFINISHERS . BALANCERS . SPECIAL MACHINES



Only the speed of the operator limits the 912's riveting speed. Completely automatic. A push an the foot pedal automatically

A push an the toot pedal automation feeds, inserts and clinches the rivet.

2 DOES WORK OF SEVERAL MACHINES
Quick change rotary hopper and race-

way makes the 912 adjustable in 5 to 10 minutes to set different size rivets. Adjustable anvil height and 12-inch throat provide further versatility.

vide further versatility.

2 SAVES ON MAINTENANCE . . .

The 912 is massively built to stand the shocks of constant use and is designed for quick, easy servicing and parts replacement.

If your assembly calls for 3/16" steel tubular rivets or smaller, of 3/4" lengths or less, ask us to show you how the 912 can cut your fastening costs. Send a sample of your problem assembly (or blueprint) for a free fastening analysis.



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Here it is! The Kling Combination Shear, Punch and Coper that handles all the different operations shown above and many more. One of these Kling Machines in your shop can turn out the work of a separate punch, angle shear, bar shear, plate shear or notcher-and yet it

costs only a few dollars more than a singlepurpose punch.

Available in 3 sizes for light, medium or heavy work; all ruggedly built, and all meeting machine tool precision standards.

SEND FOR FREE BULLETIN that gives you complete details of all the jobs this machine can do; full technical data and specifications. Ask for Bulletin 347. Kling Bros. Engineering Works, 13. North Kostner Avenue, ing Works, 13. N Chicago 51, Illinois.















With more than 100 times the wear of steel and highest corrosion resistance, Fonda Lifetime-Carbide Gage Blocks need never be replaced or recalibrated under normal usage. Acclaimed by leading manufacturers in the metal-working industry — and many others — who must have permanent precision. The unsurpassed excellence of Fonda Lifetime-Carbide Gage Blocks is further confirmed by the National Bureau of Standards.

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— for applications requiring less wear and

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"ULTRA-FINISH" gives superior flatness and surface finish to all Fonda Gage Blocks. This exclusive machine-lapped finish makes possible effortless wringing and unbelievable adhesion. Wringing is done with the blocks clean and dry, eliminating surface films that produce errors.

Write for the new 1952 edition of our catalog: "Precision in Millionths."



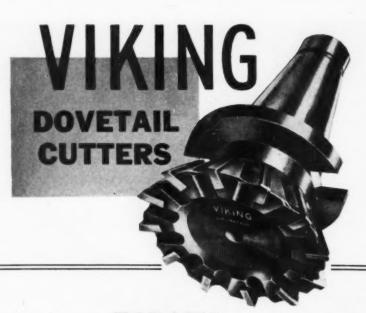
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82-piece set



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Designed to meet TODAY'S Production Problems

CHECK THESE ADVANTAGES

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Special designs engineered to customer specifications VIKING

DUAL THREAD SCREW and WEDGE LOCK are incorporated in our line:

Inserted carbide turning and facing tools, face milling cutters, end milling cutters, shell milling cutters. Inserted HHS and carbide side, half side, and interlocking milling cutters.

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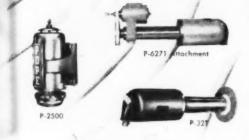








P-2652A





Both the QUALITY and the
QUANTITY of a machine's production
largely depends on the SPINDLE.
For trouble-free operation and
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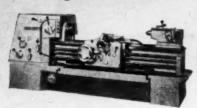
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LATHES

handle a wider range of work-

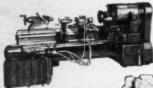
increase output lower operating costs

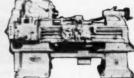












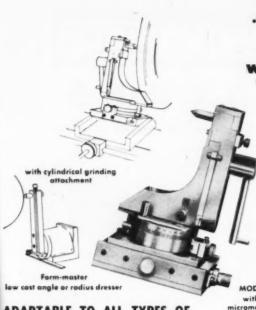
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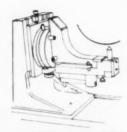
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dress two angles tangent to a radius in one continuous motion



with under wheel attachment

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Machine Against Muscle

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In 1924 the dream of a man named Joseph W. Sullivan was realized in a revolutionary new tool that was to take the industrial world by storm. The portable power saw was born and a young company was off to a flying start.

Inevitably, the success of this new power tool attracted imitators, brought others to the field. In spite of this, Skilsaw, Inc. maintained a leadership which continues to keep it first in the field.

With this remarkable growth came stronger and stronger demand from all industry for other kinds of power tools built with SKIL Quality, other ways to replace muscle with machine and do jobs better, with less work in less time. Skilsaw, Inc., has answered this demand —now offers more than 160 different models of portable power tools, each one an example of the finest engineering and quality in the field—SKIL Quality!

So it is with justifiable pride that we now alter a corporate name we have in simple fact outgrown. Hereafter, the company long known as Skilsaw, Inc., will be known as SKIL Corporation, the name to be remembered in the manufacture, sale and service of portable power tools for all industry.

SKIL Corporation

formerly SKILSAW, Inc.

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26 DIFFERENT TOOLS BESIDES SAWS ... IN OVER 160 MODELS



Precision Flatness and Finish.

On Metals, Ceramics Quartz and Plastics

Many manufacturers are using the Lapmaster is experimental work is carried on in the laboratory and, as a result of the consistency of this machine in producing precision flatness, larger Lapmasters are put into production in the manufacturing line. One such manufacturer of sterring gear assemblies saved considerable time over hand lapping of washers and worms. Schools and manufacturers engaged in restricted defense work are finding and utilizing advantages of the old operation of lapping when produced to the control of the c

Consistent Flatness of 1 Light Band (.0000116") Opens Countless Possibilities For Product Improvement

Manufacturers of pumps, compressors, and Guipment containing liquids or air under high pressures have found it possible to eliminate gaskets in mating surfaces because of the extreme accuracy of sovie produced by the Lapmaster Quality of surface (RMS) is controlled by Lapmaster ompounds. Micro-inch finishes of 2 to 3 RMS are common. Surface fatness can also be held to less than one light band or 0000116". (11.6 millionths of an inch.)

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Lapmastess are extremely versatile lapping machines. Precision thatness and super finish can be generated in both small and large production quantities. In one cycle, Lapmasters can precision lap either identical parts or parts of dissimilar shapes and





LAPMASTER Monochromatic Lights and Optical Flats

Here's the equipment you'll need for checking accurate lapping

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"The Monochromatic Light is a sturdy, completely self-contained and portable precision instrument that can handle any size part. Reversible light head permits checking normal size pieces on the stage, larger parts in a table. Light is of high power

to show visible bands on relatively long polished surfaces and materials difficult to check. Power supply is a 5000 volt teansformer operating on 110-120 V., 60 cycle current.

Lammatter, Only all Flats offer the most accurate standard of measurements.

Lapmaster Optical Flats offer the most accurate standard of measurement available. They are made of highly transparent quartz which holds its shape indefinitely, is abrasion resistant and resists thermal shock. Plats are available to a standard of either 1-10 or 1.5 of a light band across their diameter.

Additional Data

on this outstanding machine is available on request. Write today for Bulletin BB10





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CRANE PACKING COMPANY
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- 1.S-J Counterbore Cutters—solid, High-Speed Steel or Tungsten Carbide Tipped.
- 2 \$-J Countersinks—solid or piloted; solid, H.S.S.—with 60, 82 or 90° included angle.
- **3 S-J Counterbore Drivers**—Shown with cutter and pilot. Drive S-J Counterbore Cutters, Countersinks, Core Drills and tools having Standard Stub Taper Shanks.
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- **6 S-J Core Drill Holders**—Used where chip removal is a problem. Shown with cutters; 4 flutes, 20° spiral. **Style 1** for deep hole drilling. **Style 2** for shallow hole drilling. May be run through bushing.
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SCULLY -

WRITE FOR BULLETIN No. 5-50

Shows complete information on S-J Counterbores, Countersinks and Core Drills.

R-5904MTB

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The dusts from industrial grinding operations can be valuable. This is particularly true of dusts from diamond-impregnated wheels, which today have a real cash value.

Torit Dust Collectors are ideal for capturing and saving dusts from grinding operations. As diagrammed above, air moves from the *outside to the inside* of the filters. These, in turn, are made of a specially hard-surfaced and tightly woven material. No dusts become enmeshed. A few strokes of the foot pedal shakes all dust into the storage tray.

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Manufacturing Co. 303 Walnut Street St. Paul 2, Minn.



SNOW

FULL UNIVERSAL MACHINES

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Crossdrill and C"T" Sink 1/16" Hole

Material—Brass Production—4800 per hour Fixture—#15 Vertical index Equipment—#1-UD Drilling Machine



TAPPING

Tap Two #10-32 Heles

Material—Steel stamping Production—3800 tapped holes per hour

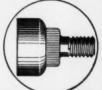
Fixture—#14 horizontal index Equipment—#1-UT tapping machine



THREADING

3/8"-24 Thread-1/2" Long Material-Die Cast Aluminum

Material — Die Cast Aluminum Production — 2500 per hour Fixture — #10 Drum dial Equipment — #3-TR Threading machine



Snow air operated—electrically controlled machines have built in full universal controls that allow selection of the type of spindle cycle desired. This feature also permits instant synchronization of the standard Snow Master Fixtures All types of air operated automatic and semi-automatic jigs and fixtures are carried in stock. Standardization permits low cost tooling—and—high production. Sensitivity of power application pre-

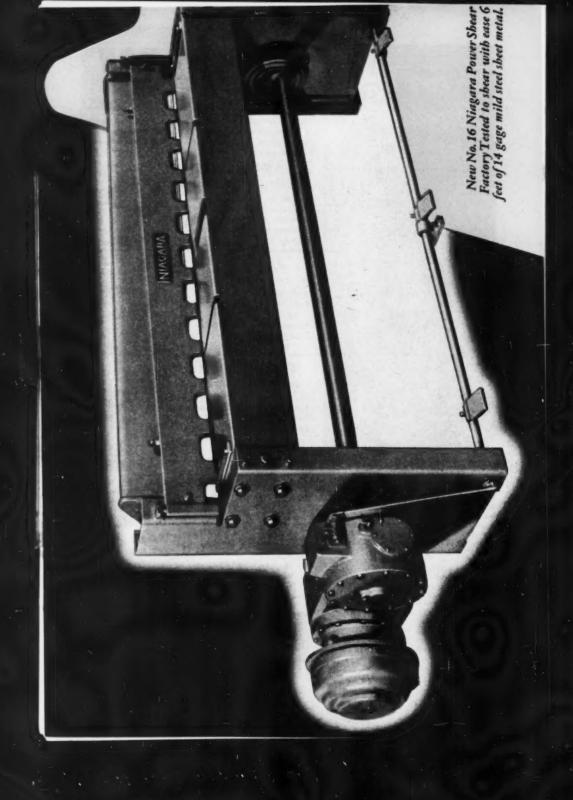
vents tool breakage.
Simplicity of control means that set up
and operation can be handled by a less

experienced operator with minimum

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Manufacturers of a Complete Line of Single Spindle Automatic Screw Machines and High Pressure Hydraulic Die Cesting Machines

SIMONDS BAND SAWS

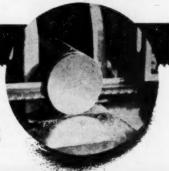


... for Contour Cutting

Made of tough, alloy steel that resists breaking, yet holds a keen cutting edge, Simonds Standard-Tooth Hard-Edge Band Saws in the marrower widths are outstanding favorites for contour work. That's why you'll find them so widely used in die-making and contour sawing of all kinds. Perfectly formed teeth, set with absolute evenness on both sides of the blade, insure smooth, accurate results and greater satisfaction

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In the wider widths, these rugged, long-lasting Hard-Edge Blades are "tops" for use on horizontal machines, cutting off bars, tubing, angle iron, etc. Furnished either Regular Set or Wayr Set to handle the variety of cutting encountered in steel warehouses and general shop work. Hardy new 100° and approximately 300° coil containers insure factory perfect saw blades. Welded-to-length saws also supplied.





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High-Speed CUTTING MACHINERY

For production cutting of ferrous and non-ferrous metals at the rate of 4 seconds per square inch.

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Floor Model — minimum space required 2½' x 4'.
 Full 7½ 's. p. geared-in-head motor engineered with positive urive.
 Self centering vise mounted on swivel plate permits quick change for cutting any angle to 45°.
 CAPACITY — Ferrous and non-ferrous solids up to 2½" — pipe and structurals up to 4". Can be furnished equipped for wet cutting.

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with Cross Feed

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Operates on guided rails for cuts up to ten feet in length.
 Develops 10 h.p. with geared-in-head motor engineered with positive drive.
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 8" cross feed travel.
 Rails furnished in 6 feet and 12 feet lengths. Special lengths can be furnished.
 Up to 22" diameter cutting wheel.



MODEL M-14

* 32'' x 34'' bench model. * Full 31/2 h. p. geared-in-head motor engineered with positive drive. * Cutting head swivels up to 45'' in either direction for angle cutting on swivel model. * Lower priced model available as straight cut-off. * Complete set of legs available to convert to floor machines.

to 2"— pipe and structurals up to $2\frac{1}{2}$ ".



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with Standardized

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TOOL STANDARDIZATION IS THE BASIS FOR SAVING PRODUCTION TIME. WITH R-B YOU GET THE ACCEPTED STANDARD OF THE SHEET METAL INDUSTRY — IN STANDARD DESIGN FEATURES THAT SAVE IN ENGINEERING, DIE CONSTRUCTION AND OPERATION.



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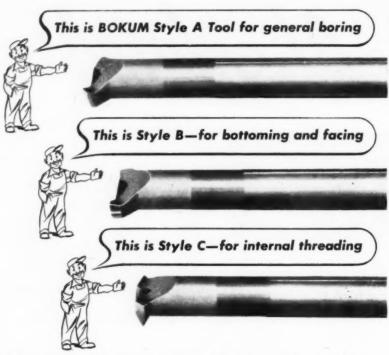
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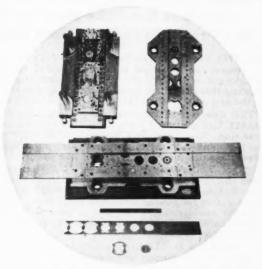
BOKUM TOOL CO.

SINGLE POINT FORING TOOLS -- INTERNAL THREADING BOTTOMING AND FACING TOOLS -- CARRIDE TIPPED TOOLS

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This die was not just "made"...

it was ENGINEERED



Just a choice of words, you say? No, it's more than that. The progressive steel lamination die shown here was hole-bored, hole-ground and contour-ground to pre-engineered dimensions entirely on Moore-built machines in the Moore toolroom. It exemplifies the application of engineering principles that put diemaking on an interchangeable parts-and-assembly basis for the first time.

Let's take a close look at this die: All die sections are mounted in a hardened nickel-chrome frame for maximum production and die life; the die set was specially made by Moore. The spring stripper is guided on four main posts. High-speed inserts are set into hardened steel frames.

Moore produced all parts of the die to figures instead of to "fit." This was done concurrently by several toolmakers instead of progressively as a slow, one-man job.

Precision Hole Location and Contour Grinding Methods Assure Accuracy, Speed, Economy

THE NO. 2 MOORE JIG BORER bored all holes before hardening, thus holding the location as close as possible to eliminate

excessive grinding. With its built-in system of accurate lead screws, the Moore Jig Borer can spot, drill, bore or ream all holes in a workpiece with minimum tool changes and to close tolerances.

Punches and dies of the first station—at the right in the photograph—were ground with a Moore Panto-Crush Wheel Dresser. This machine, which combines roll-crushing and diamond dressing, did the required linear contour grinding quickly and effi-



No. 2 MOORE

ciently. Moore Motorized Centers handled several of the smaller grinding jobs.

WITH THE NO. 2 MOORE JIG GRINDER, all die sections were screwed and doweled into place, put on the machine and ground in one set-up. This eliminated separate section hole-

grinding and the accompanying difficulty of accurately locating each section in the die bed. The Jig Grinder does the job in onethird the time required by previous methods.

To grind Stations 2, 3, 4, 5 and 6, the new contour-grinding and slot-grinding features of the Jig Grinder were utilized.

Die try-out and assembly operations were performed the modern, fast, "mechanized" way on the Moore Die Flipper.

End results? Moore equipment brings true interchangeability to the toolroom, lowers tool costs, increases toolroom capacity, prolongs die life and achieves greater accuracy.

prolongs die life and achieves greater accuracy.

Detailed bulletins on these machines are yours for the asking—today. Write to: Moore Special Tool Company, Inc.,

ing-today. Write to: Moore Special Tool Company, Inc., 728 Union Avenue, Bridgeport 7, Conn.

ADD (TO YOUR TOOLROOM

JIG BORERS - JIG GRINDERS - PANTO-CRUSH WHEEL DRESSERS
DIE FLIPPERS - MOTORIZED CENTERS - HOLE LOCATION ACCESSORIES

CAN YOUR SURFACE

Rigid DoALL Surface Grinders Can Take Heavier Cuts and Produce Precision Work Faster

TRY THE TEST illustrated at the right. Take the heavy cut, reverse the crossfeed and let the wheel run back over the ground surface. If it sparks it is grinding again, showing that the wheel didn't take the full depth of cut on the first pass. If it is a DoALL Grinder it won't spark.

This demonstration proves the great rigidity of the DoALL Grinder, shows why it will do a given job in less time. You can take a heavier cut without "give" in the spindle or the table. The wheel doesn't climb over the work piece-it cuts true in one pass.

COOL GRINDING. With DoALL "Cool-Grinding"* you can take these heavier cuts without burning the work. Coolant flows in at the hub, through the wheel and out at the point of contact in a fine mist. There is always coolant where the heat is generated, unlike flood cooling where the wheel blasts the coolant away from point of contact.

There is a DoALL Surface Grinder for every toolroom or production requirement. Call your local DoALL Sales-Service Store today or write:

THE DOALL COMPANY

254 N. Laurel Ave., Des Plaines, III. 35 Local Sales-Service Stores in North America

*U. S. Patent No. 2470350

HERE'S WHY DOALL PRECISION HYDRAULIC SURFACE GRINDERS ARE FASTER, MORE RIGID, MORE ACCURATE!



MASSIVE FRAME-column support and base are single-piece chrome nickel steel casting, strongly ribbed for great rigidity.







GR-65

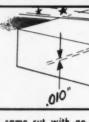




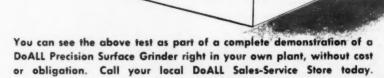


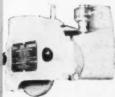
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 Take a .010" cut with a .010" cross feed in high chrome—high carbon steel.



Run back over the same cut with no spark out!





HUSKY SPINDLE SUP-PORT, dewelled and boited to column, prevents wheel from chattering or springing away



VERTICAL FEED IN INCRE-MENTS OF .0001" — made possible by rigidity and precision of extra-long 30" column.



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- ... untouched by human hands!
- ... to plus-or-minus .035 oz.1
- ... at 12 per minute rate!

pistons balanced automatically

Pistons are unloaded automatically from a standard conveyor, processed or rejected and returned to the conveyor "untouched by human hands."

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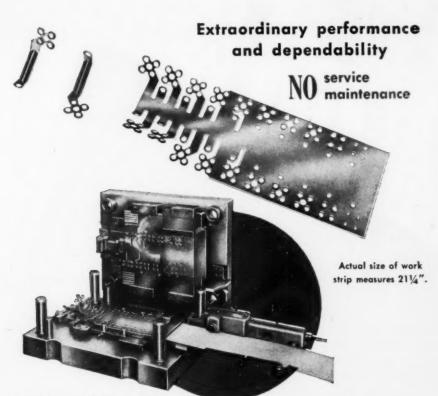
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ELEVEN station progressive die for production of right and left hand ignition cable supports. Photograph illustrates Rol-Di-Feed mounted directly on die set, feeding .073" thick x 77/8" wide c.r.s. In operation over two years—customer reports no service or maintenance expense!



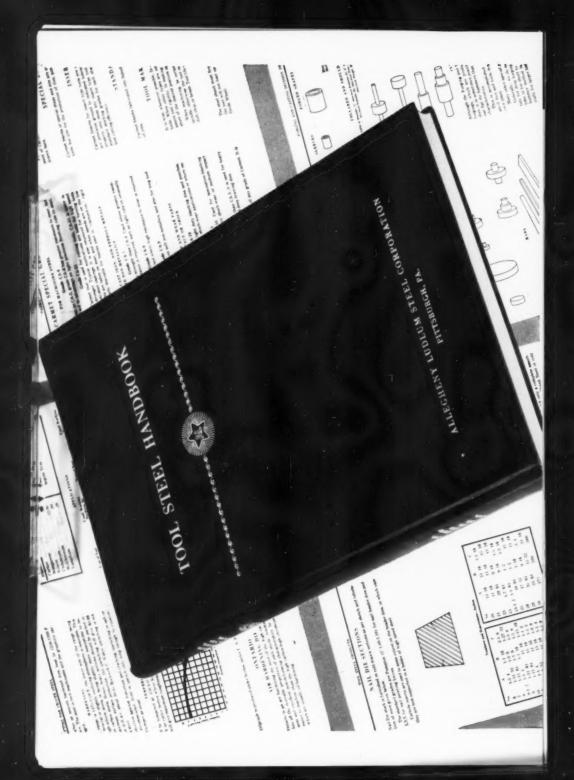
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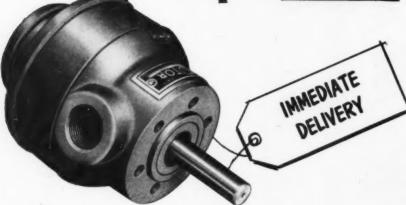
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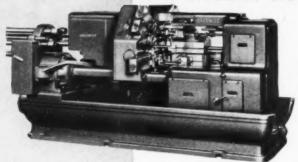
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SETTING TOOL-SLIDE STROKE

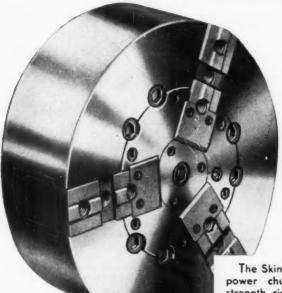


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Write for catalog giving complete details on the Skinner line of power and manually operated chucks. And ask about new movie "Chucks and Their Uses" — available for free showings.

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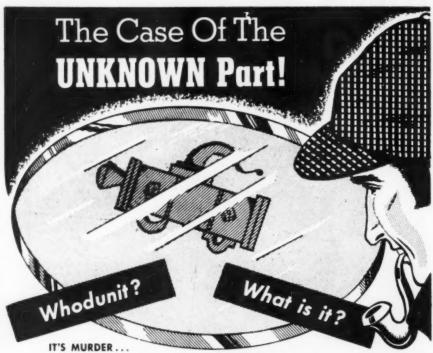
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Series 1300



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ELIMINATE production bottlenecks caused by premature die wear and breakdowns! You too can change to HARIG tools and dies and save thousands of dollars as have many/leading manufacturers. Consult our engineering staff - experienced in designing and building dies for every purpose regarding your current die demands.

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Ames No. 1 Dial Comparator is an easily adjustable bench model that measures objects up to 2" in cross section. The table bracket may be quickly located and locked in position on the column. The table itself may be further positioned and locked for final fine adjustment. This comparator is designated Ames No. 1W when equipped with dead-weight contact pressure and contact area to ASTM specifications for measuring resilient materials.



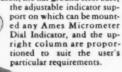
Ames No. 2 Dial Comparatoris a compact, stable bench model for measuring non-yielding materials — sheet metal, glass, hard rubber. The 2" diameter table is adjustable to bring pointer to zero.

Ames No. 2 W is similar to the Ames No. 2, but is furnished with dead-weight contact pressure and contact areas to ASTM specifications for checking textiles, plastics, sheet rubber, etc.



Ames No. 13 Dial Comparator features flat-ground, castiron base of ample size for using V-blocks and locating fixtures for checking rounds, flats and odd shapes. Also, the No. 13 can be fitted with a fine adjustment for close setting. Accurately adjustable bracket holds any Ames

holds any Ames Micrometer Dial Indicator. Ames No. 130 Dial Comparator is designed especially for inspecting comparatively large parts. For this reason, the flat-ground steel base,



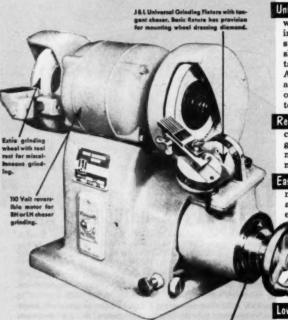
Send us your Quality Control job specifications, and we will supply complete details and proposal without obligation.

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UNIVERSAL BENCH TYPE CHASER SHARPENING MACHINE

Specifically designed to resharpen chasers, this Low Cost, space saving machine allows you to free heavy expensive machine tools for their intended uses, and at the same time do a better job of chaser sharpening. It's good for miscellaneous small tool and cutter grinding too.



Universal Application

With the new J & L chaser grinding fixture and adapters, an outstanding job will be done on all sharpening operations, for both tangent and radial die chasers. Adapters for J & L chasers available from atock. Adapters for other chasers can easily be applied to the chaser grinding fixture.

Repetitive Accuracy This machine will duplicate desired grinds repeatedly. It is a precision machine tool equipped with all necessary stops and controls.

Easy to Operate Simple, direct methods speed up the operation and cut costs. Even an inexperienced operator can, in a few minutes, learn to resharpen chasers on this machine.

Saves Space BENCH
SPACE 14 x 28 inches
is ample for your complete chaser reaharpening operation.

ow Cost This complete unit, designed to do your entire chaser resharpening job, sells for only a small fraction of the cost of other bulkier machines often used. Why not install one in your plant, and release your heavier, bulkier machines for their intended uses?



Because of its size this machine can well be a time saver in shops where cutter grinding rooms are at distant points from the machines where dies are used. Write Dept. 710G for further details.

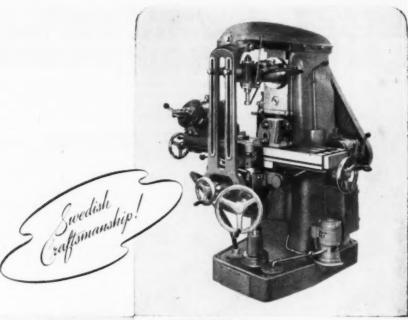
JONES & LAMSON

Grinder set up to resharpen J&L Tangent ch

Machine Tool Craftsmen Since 1835

JONES & LAMSON MACHINE CO., Springfield, Vt., U.S.A. Dept. 710

DIE HEAD DIVISION





Sojo Vertical Milling Attachment

The Sajo "Plain" Milling Machine



exemplifies the expert workmanship that is traditional in Swedish machine tools. Like all SAJO Millers, this new Universal Milling Machine was designed and built to the highest standards of quality and practical utility.

Avoidance of exterior "luxury" features, slight in value but substantial in cost, and concentration on the vital factors of construction, enable the SAJO to deliver top performance at moderate cast.

SAJO Millers are available in Plain and Universal types, with longitudinal power table feed only, or with power feed in all directions. Screws and dials are in the U.S. inch system.

* Standard Equipment includes:

3 MP motor and starter equipment, motor driven coolant system, adjustable table feed not to allow climb milling, 1" arbor,

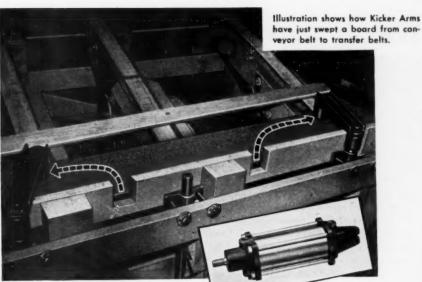
* Extra Equipment:

Universal Dividing Head, Vertical Milling Attachment, Slotting Attachment, Swivel Base Vise, Rotary Table.

CONDEN	SED S	PECIFICATIONS
Table Size 41%* Longitudinal travel: Plain Miller Universal Miller Transverse travel Vertical travel	24%" 27%" 8%"	Precision anti-friction bearing and gear shafts One piece column and base Net weight – 2200 lbs.
12 spindle speeds	12 0 NMT	Write for Catalog

NO PRIORITY ---- PROMPT DELIVERY ----- ATTRACTIVE PRICE

AUSTIN INDUSTRIAL CORP. 76-G MAMARONECK AVE.



Kicker Arms...

A NOPAK Model "E" Air Cylinder is used in the installation pictured.

Powered by NOPAK Cylinders

. . . sweep boards from Conveyor to Transfer Belts

An important phase of the panel-gluing operation at Potlatch Forests, Inc., Lewiston, Idaho, is the transfer of boards coming from the glue applicator on a conveyor belt to the transfer belts which deliver them to the electronic gluer.

As each board hits the "bumper", a solenoid valve, controlled by a microswitch, actuates a NOPAK Model "E" Cylinder. The cylinder piston rod is coupled by bell-crank linkage to roller-tipped kicker arms which swing in a horizontal arc over the conveyor belt to sweep the board off the conveyor belt to the transfer belts which run at right angles to it.

This materials handling operation is typical of many similar applications in which NOPAK Valves and Cylinders are used. For others see the NOPAK Application Manual.

GALLAND-HENNING MFG. CO., 2754 S. 31st St. . Milwaukee 46, Wis.

Refer to Sweet's File for Product Designers or write for Bulletin SW-1.

Representatives in Principal Cities



A 7250-1/2-I-A

UNCLE!

Are your machines begging for mercy because of misuse?

Blanchard Grinders, with proper grinding scheels, can and do give high production with extremely close tolerances for dimension and flatness. However, a No. 11 Blanchard user recently received erroneous advice on abrasive wheels from an outside source. The result was that 35 high-apped cam plates were ground on both sides in 1½ hours with surface finish of 24 micro-inches.

By referring the problem to Blanchard, it was easily demonstrated that the No. 11, with correct grinding wheel, would give desired results—90 to 100 cam plates per hour, with surface finish of 4 micro-inches, dimension tolerance of \pm .0002, and flat within 2 light bands.

Blanchard wheels are best for Blanchard Grinders—let Blanchard give you the benefit of their vast experience so that you too can get the most from your Blanchard machines.

PLEASE CONSULT THE
ENGINEERS WHO DESIGNED ME,
AND LET THEM SPECIFY THE
CORRECT BLANCHARD WHEELS,
SO THAT I CAN WORK FOR YOU
BETTER, FASTER, AND CHEAPER

Information on correct surface grinding procedure and wheel selection are given in "Work Done on the Blanchard" and "The Art of Surface Grinding."Write for free copiestoday!



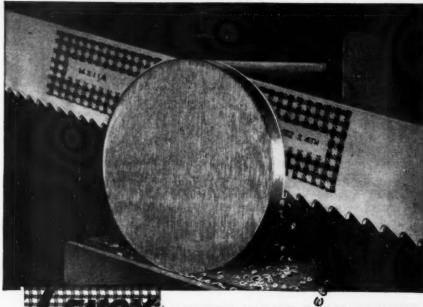


THE BLANCHARD MACHINE COMPANY

PUT IT ON THE BLANCHARD

64 STATE ST., CAMBRIDGE 39, MASS., U.S.A.

When the chips are down



POWER HACK SAW BLADES
are best by every test!

QUALITY . . . The very finest in both steels and workmanship

SERVICE . . . Prompt Deliveries

TECHNICAL ASSISTANCE . . .

Whenever needed on unusual or difficult cutting problems

These things we pledge to you. The final test is on your own machines. Try Lenox for yourself...on any job...against any other blade in the world. Then you be the judge.



LENOX

& MFG. COMPANY

HACK SAWS BAND SAWS GROUND FLAT STOCK

SANFORD BENCH SURFACE GRINDER MODEL SG

for Wet*or Dry Grinding!

A low cost, precision machine for surface grinding dies, instrument parts, gauges and other small parts which would fit in the palm of the hand.

By using Sanford Bench Grinders many manufacturers of precision machinery have drastically cut over-all costs for finishing small intricate parts. This releases large, more expensive machines for heavier duty work.

The Sanford SG is the only low cost Bench Surface Grinder that

- Grinds to less than .0001"
- Operates without vibration
- Assures long life because Meehanite castings are used in its construction

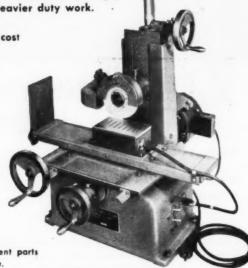
SPECIFICATIONS—4" traverse -8" longitudinal—6" vertical under 4" wheel Approximate

under 4" wheel. Approximate weight 160 lbs. Complete details are included

in illustrated bulletin. Send for your copy today.

Reconditioning facilities, replacement parts and special attachments are available.

Send for price list.



*With optional equipment



MANUFACTURING CORP.

1026 Commerce Ave., Union, N. J.



Welcome to our new home!

See how you get better service in portable tools from our 25th Anniversary Plant!

You'll be excited too when you see our new home at 26300 Lakeland Blvd. What a set-up to give you better portable tools and better service!

Air conditioned. The whole plant! Clean, dry air for high-precision work. Greater working comfort steps up our service to you . . . in quality and speed.

More production. Modern, top-rated tools and more of them. More space. Good light!...55 foot-candles average.

Fast service. Greater facilities for application engineering help. Large stock room for fast parts service.

Come see this new plant! Or, write for our circular which tells all about it . . . what it means to you.

AIR O'TOOL and HI-CYCLE O'TOOL

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THE ROTOR TOOL CO.

CYCLE

CLEVELAND OHIO

How \$25. and a DAKE Press

saved \$1,200 worth of bushings from going to the scrap heap!





Through a purchasing er-ror, a manufacturer ordered 286 cylindrical bronze bushings .002" oversize-both inside and outside diameter. Since each bushing cost about \$4.50, it would have meant a loss of more than \$1,200 to scrap them.

So the manufacturer called in a machinist who works wonders with his Dake Hydraulic Press. Together, they figured that by building a tapered die and pressing the bushings through, it might be possible to shrink the bushings the necessary .002" both I. D. and O. D.

The die was made, and the pressing job was so successful that all but two or three of the bushings were salvaged. The die required about four hours to make, and pressing time was another four hours. Total cost of the job-eight hours labor and a small amount for material-less than \$25.

The accurate operation of Dake Hydraulic Presses recommends them for scores of production, maintenance, and salvage operations. Do you have this versatile equipment?.. are you using it to best advantage? . . . see your Dake distributor.



Write for this Catalog

Dake Engine Company, 608 Seventh St., Grand Haven, Mich.

DAKE PRESSES



















embody all the accumulated experience of our 50 years as pioneers in the art of broaching. This valuable "know-how" is put at your disposal every time you send us an order or an inquiry.

Being the world's largest manufacturer of broaching machines and broaches, it is of course to be expected that our facilities for producing broaches of any size or shape, in any quantity, cannot be equalled.

Recent plant expansion has still further increased our capacity to produce broaches... although we are already the largest producer of broaches in the industry!

It is definitely to your advantage, when you need broaches, to look to the leader . . . look to LAPOINTE!

Send for our brochure on broaches. Ask for Bullatin B.7



MACHINE TOOL COMPANY

HUDSON, MASSACHUSETTS . U. S. A.



THE WORLD'S OLDEST AND LARGEST MANUFACTURERS OF BROACHING MACHINES AND BROACHES

Outstanding Values by America's Largest Builders of Dividing Heads



SPINDLE THREADED 1½"-8 TO FIT L-W 5" UNIVERSAL CHUCK
Heavy duty headstock and tailstock designed for maximum rigidity. Alloy steel threaded
headstock spindle with extra large tapered bearing and takeup adjustment collar. Head
tilts to 90° in vertical position. Alloy stress-proof steel worm and accurately cut worm wheel
cut to close limits for accuracy. Ball bearing thrust and adjustable for end play. Complete
with three index plates for dividing all numbers to 50 and even numbers to 100, except 96T.
Index chart shows all divisions obtainable to 380. Right or left hand models.

You Can't Beat Them For Accuracy and Ruggedness



Model BP 11" Swing for plain milling machines. Shipping weight, 140 lbs.



Order from your industrial supply distributor or order direct, giving name of your distributor.

Send for complete catalog giving prices and specifications on these quality, low-cost L-W Products 23 SO. ST., CLAIR ST. -W CHUCK COMPAN TOLEDO 4, OHIO

Blownt Model VS-50 Lathe

Specifications:

CAPACITY: Swing up to 12" dia. over main part of bed, 16" over gap in bed. Regular bed 62" long, will take 43" between centers.

BED: One piece fine gray iron casting, ribbed and reinforced by cross members. Top planed, filed and frosted.

DRIVE: 1/2 H.P. regularly furnished with 1800 RPM, 60 cycle, ball bearing standard open type motor mounted within ventilated headstock leg. Motor drives spindle thru variable pitch "V" pulleys.

MAGNETIC STARTER: with overload and low voltage release with remote push-button furnished as standard equipment wired ready for use.

SPEED CONTROL*

A NEWLY DEVELOPED BLOUNT FEATURE is the speed control hand wheel placed at the end of head-stock leg. Spindle turning diameters are indicated with RPM generally used, designated so hand wheel can be set for any desired speed. No need to change belt, shift motor or stop lathe to change speeds. Wide range of speeds provided. Many of these lathes are being used in metal spinning, metal polishing and burring operations.

Floor space required, 66" long, 12" wide. Overall height $45\frac{1}{2}$ ". Weight, 480 lbs. Equipment regularly furnished.

Write today for free bulletin

J. G. BLOUNT CO., MASS, U.S.A.

Boyar-Schultz

No. 2 PROFILE GRINDER

... for grinding Irregular
Shapes and difficult Contours

A standard machine tool in die shops and in tool rooms where grinding odd shapes and difficult, irregular contours is necessary.

It is a particularly useful machine for grinding and fitting large dies and punches such as forming dies for refrigerators, table tops, sanitary ware and in automotive and aircraft shops.

Spindles in dual spindle model illustrated, turn at 10,000 RPM; stock removal is rapid even with small diameter wheels. Uses wheels ½" to 3" in diameter.

No. 1 Profile Grinder

A bench model with spindle speed of 20,000 RPM. Performs in minutes, many jobs that would ordinarily require hours. Uses wheels 1/8" to 1" diameter.



BOYAR-SCHULTZ

2108 WALNUT STREET, CHICAGO 12, ILL.

WRITE
FOR LITERATURE
FULLY DESCRIBING THESE
TIME SAVING
MACHINE TOOLS

BOOST YOUR DRILLING OUTPUT

WITHIN 2 WEEKS

Are slow machine tool deliveries delaying your work? The Ligno-matic drill turret is currently being delivered in two weeks. Easily attached to any standard drilling machine without altering the machine, the Lign-o-matic handles all drilling operations up to ½ inch diameter in any material.



PROVEN PRODUCTION INCREASES — Lign-o-matic turrets increase output on consecutive drilling operations. Turret indexes faster than tools can be changed or work moved to another spindle. The need for several jigs are eliminated. A single Lign-o-matic will release up to five drilling machines for other work and still show increased production and reduced costs on original job.

PRECISION PLUS — Lign-o-matic is the only turret with the patented self-centering principle which guarantees sustained accuracy equal to the drilling machine itself. The Lign-o-matic has been designed and constructed for long, hard use with minimum maintenance . . . and maximum speed, accuracy, versatility, and dependability.

MONEY BACK GUARANTEE — Try it at our expense. If you are not completely satisfied for *any* reason, return turret within 10 days and pay nothing! Two-year guarantee against defective parts.

PRICE — Model D, 6 spindles with No. 2 Jacobs male taper . . . \$235.00.

DELIVERY — Currently, 2 weeks.

Please rush Lign-o-matic turrets f	or (drill press make)
(size) (quill dia.)	(spindle taper)
My name	***************************************
Title	
☐ Please send literature on Lign-o-matic turret. (A	ttach coupon to company letterhead)
HOWE & FANT, INC.	535 FLAXHILL ROAD

NAMCO VERS-O-TOOLS and COLLAPSIBLE TAPS

SET THE STANDARD

for continuous, high production on rocket tube threading

other method-in time-saving, in sustained quality and in troubleinstallation have since been adopted as standard at ten other plants free operation. The procedures we helped work out for the first pilot On this rocket job these Nameo threading tools outperformed any contracting for the same job.

Regardless of the type of threading work you are doing, may we show you how the same basic principle can be applied to save you time, money and materials—with Namco Vers-O-Tools and Collapsible Taps?



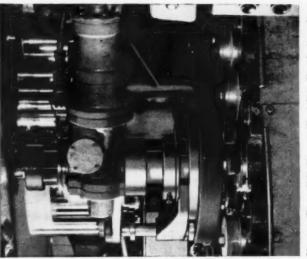
JOB FACTS

PART—Rocket Nozzle

MATERIAL—X 1117 Steel

OPERATION—Thread 43/" Diameter, 12 Pitch, Class 2 Fit
MACHINE—W.F. and John Barnes

DIEHEAD—Namco Type DR 47/8 Vers-O-Tool with 6 ground thread circular chasers



Nameo Type DR Vers-O-Tool Die Head threading rocket nozzles on a W. F. and John Barnes Drill—Elementon Stool Products Division Plant Alexan Ohio



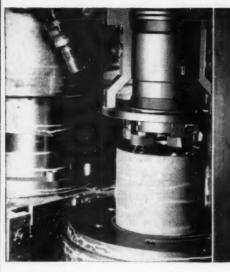
MATERIAL-NEA-8620 Steel, heat-OPERATION-Tap 43/4" Diame-MACHINE—Lehman Double-End treated to Rockwell C-28-30 ART-Rocket Motor Tube ter, 12 Pitch, Class 2 Fit

TAP-Namco Type RST 5" Collapsible with 5 ground-thread



Tools and Namco Collapsible Taps, available for complete information on Namco Vers-O. with ground thread precision chasers.





Nameo Type RST Collapsible Tap tapping rocket motor tube on Lehman Double End Tapper-Fire. stone Steel Products Division Plant, Akron, Ohio

he NATIONAL ACME CO

170 EAST 131st STREET . CLEVELAND 8, OHIO

Acme-Gridley Bar and Chucking Automatics: 1-4-6 and 8 Spindle . Hydraulic Thread Rolling Machines • Automatic Threading Dies and Taps-The Chronolog • Limit, Motor Starter and Control Station Switches . Solenoids Centrifuges . Contract Manufacturing

CUT COSTS WITH MULTIPLE BENDING

Whether you're bending pipes, tubes, reinforcing bars or structural shapes, you can greatly increase your bending production by multiple die bending.

Shown here is our Model A-5 BENDING MACHINE tooled for bending 3 different radii without changing the set-up. In order to make multiple bending cost no more per die than single bending, individual dies are merely stacked on the die spindle and a shoe of the proper width permits the same degree to be bent without changing the automatic reset switch. The MODEL A-5 will bend pipe up to and including 2" standard weight pipe.

Redesigned and greatly improved, the Model A-5 still sells for only \$1975. F.O.B. factory, U.S. Funds.

Smaller and larger machines available.

Write for detailed and descriptive folder.

PEDRICK TOOL & MACHINE CO.

3640 N. LAWRENCE ST.

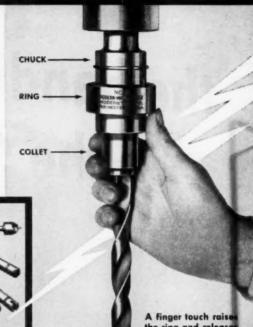
DEPT. 3

PHILADELPHIA 40, PA., U.S.A.

Speed up your production

Change tools without stopping . . . or even slowing the machine

MODERN-MAGIC **QUICK CHANGE** CHUCK and COLLET EQUIPMENT





the ring and release the tool . . . instantly

Modern Precision Tools Include . STATIONARY SELF-OPENING DIE HEADS ROTARY SELF-OPENING STATIONARY COLLAPSIBLE TAPS COLLAPSIBLE TAPS MODERN-MAGIC CHUCKS AND COLLETS SELF-OPENING STUD SETTERS INSERTED BLADE SOLID ADJUSTABLE DIE HEADS ADJUSTABLE HOLLOW UNIVERSAL CHASER GRINDING FIXTURES

Modern-Magic Quick Change Chuck and Collet Equipment virtually eliminates costly lost time of revolving spindle machines. Used with such machines, tools are changed without stopping or even slowing the spindle. Changes are made from drill to reamer to tap instantaneously and safely while the machine is running at cutting speed. In this way, the Modern-Magic Chuck and Collet Equipment gives multiple spindle range to single spindle machines, increasing production and cutting cost. In high production shops, it has been proved they save time even though used only for changing from dull to sharp tools.

> For full information, send for Bulletin M-103. In addition to standard Modern-Magic Chucks and Collets, it shows special types of each.

Only the ORIGINAL Modern-Megic Chuck and Collet Equipment carry the name "MODERN-MAGIC" and are manufactured by Modern Tool Works, Rochester, N.Y.

MODERN TOOL WORKS

CONSOLIDATED MACHINE TOOL CORPORATION SUBSIDIARY OF FARREL-BIRMINGHAM COMPANY, INCORPORATED ROCHESTER, NEW YORK

the handiest tool in the shop for

Kaskins.





Write us, describing the operation you're thinking of for Haskins equipment. We've years of experience at your service. Meantime, send for complete Catalog.

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weld-blending			buffing die-finishing	
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12" SUPERSPACER



This versatile tool eliminates expensive jigs and fixtures. It is ideal for both long and short runs. Special chuck can be used either as a faceplate or a chuck. Through hole permits passage of work up to 4" in diameter and allows use of centering plug if necessary.

Illustrated at the left is the Super-Spacer set up to accommodate horizontal axis mounting.

Increase your production . . .

write for new bulletin now!

When it comes to production -

AUTOMATIC DRILLING & TAPPING MACHINES



RUTOMATIC THREAD ROLLERS





THE HARTFORD SPECIAL MACHINERY CO., HARTFORD 12, CONN.

Specify *American*Broaches

BROACHING MOTOR COUPLINGS WITH AN AMERICAN STANDARD KEYWAY BROACH

A simple operation yet requiring accuracy is the production broaching of keyways in motor couplings.

In this tooling set up the operator is not required to remove the American keyway broach from the pull head as he threads the part over the broach onto a work horn. High production is obtained as a part is loaded on each return stroke.

Whether your problem is keyways or complicated involute splines, American broach engineers can design the proper broach to produce parts to your requirements.

FINISH BROACHING AUTOMATIC TRANSMISSION DRIVE GEARS

The prime requirement of automatic gears is silence in operation and long life. American broaches are used to finish the drive gear's helical involute teeth on the American machine shown to the right. No further internal machining is necessary on these gears which must pass rigid tests before final assembly.

Let American quote on your broaching requirements — machines, broaches and fixtures. Send a part print and full information. For the best results use American breaches --whether you breach keyways or drive goers.





Complete broaching information. Write for Catalog 450 today.



AMERICAN BROACH & MACHINE CO.

ANN ARBOR, MICHIGAN

See American First-for the Best in Broaching Tools, Broaching Machines, Special Machinery













THE GISHOLT ROUND TABLE represents the collective experience of specialists in the machining, surface-finishing and balancing of round and partly round parts. Your problems are welcomed here.

Smoothed by GISHOLT BALANCING

Heart of the jet propulsion engine is the high speed impeller (air compression member) which rotates at speeds above 15,000 r.p.m. The impeller must be free from any trace of unbalance, for at such speeds, the slightest vibration is disastrous.

Gisholt DYNETRIC Balancing Machines do the job so well that these ultra high speed rotors spin with an off-center displacement of less than .000025"! They make such a quick, easy and accurate job of it that they are used almost universally for this work.

In fact, Gisholt DYNETRIC Balancing can be used to balance anything that rotates—from ½ ounce to 50 tons. Freedom from unbalance vibration means greater safety, less wear, better service—and distinctly longer life.

*Write for free booklet "Static & Dynamic Balancing."

GISHOLT....

Madison 10. Wisconsin





FRICTION **SAWING** with

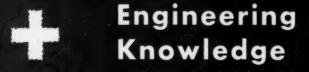
Tannewitz HIGH SPEED BAND SAWS

> Tremendous savings of time and money are effected in trimming formed parts with Tannewitz High Speed Band Saws, for not only are the cuts made fast and smoothly, but in most cases no jigs or rests of any kind are required. Sheets of both soft and hard steel, non-ferrous metals and many other materials are also handled to great advantage by this method and it is perfect for trimming castings. By all means get the complete facts and learn of the many opportunities for boosting production and lowering costs that Friction Sawing with Tannewitz High Speed Band Saws offers.

THE TANNEWITZ WORKS GRAND RAPIDS

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Our Experience







The AFBDA member in your area
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Not only will you get the bearing you need when you need it from your AFBDA member, but also the years of experience and bearing "know how" that will help you eliminate early bearing failures due to inadequate maintenance practices and improper installation procedures. When you have a bearing problem, you can save time and money if you ask this "Bearing Specialist" for the answer. His considerable investment and highly trained personnel are your guarantee of economical, satisfactory service. Get acquainted with this AFBDA member now!



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Learn new maintenance practices, better ways to make bearings last longer. Second year of publication! WRITE TODAY!

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Remember 1377 The Outstanding Name in MILLING MACHINES

For High Production and Precision, Low Original and Maintenance Cost

MODEL 40, VERTICAL MILL has proved for 14 years that precision need not be expensive. Thousands in use, giving highly satisfactory performance. While it is not a jig borer, it is widely used for accurate boring and locating. The improved spindle drive gives nine spindle speeds, an ample range for all operations. CAPACITY, ½" to 1" end mills in tool steel. TABLE, working surface 8" x 26", 8" x 34" overall.





◆ MODEL 55 IMPROVED VERTICAL MILL. A speed range of 80 to 2700 RPM's, 1 H.P. drive, 3½ quill, extra rugged spindle, capacity of ½ to 1½ end mills in steel. Spindle quill travel is 5½ . Table 40 x 9 or larger.

MODEL 60 PLAIN HORIZONTAL MILL. A full No. 1 that equals or exceeds a light No. 2 in capacity. Designed for the average tool room, but its rigidity and low maintenance cost make it suitable for requirements of production shops. Standard Table 40° x 9° with larger table optional.

Write for Literature

INDEX MACHINE Co.

540 N. MECHANIC STREET

JACKSON, MICHIGAN



When job specifications leave no leeway, when extreme tolerances must be rigidly maintained . . . that's when the built-in precision of Grand Rapids Grinders proves most valuable.

Defense commitments make it impossible for us to fill your orders as rapidly as we'd like to...but we know our customers can appreciate the reasons for delay. As always, we're doing our best to serve you.



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GRAND RAPIDS GRINDERS

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Surface Grinders • Cutter and Tool Grinders • Tap and Drill Grinders



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Speedy Air Vise helps you do dozens of operations faster, better, cheaper—by air pressure! Foot control valve opens and shuts vise instantly, leaving both hands free to produce more! Jaw opens up to 3 inches, holds castings, parts, jigs, etc. Compact, trouble-free, inexpensive.

Complete with Foot Control Valve, Air Hose and Fittings...only \$29.90

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CHICAGO 35, ILL.

YOU PAY FOR THE BEST ... BE SURE YOU GET THE BEST

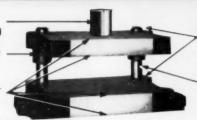
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When you specify "Detroit" die sets, you are assured micro-metric precision that means: 1) Lower costs in mounting die in die set and 2) Longer, trauble-free production runs. Factory-built die sets give you what you pay for—parallelism, squareness and finish.

Shanks cast-on, inserted or welded

"Detroit" bushings are full-bearing

Parallel surfaces held to exceptionally close limits



Leader pin holes and bushing holes are micro-metric jig bored

"Detroit" precision leader pins are superfinished

Factory-built to the most exacting standards, "Detroit" die sets are also factory-assembled and factory-inspected. You don't have to re-work "Detroit" die sets in your shop to get the accuracy and performance you have a right to expect.

For prompt factory delivery, call "Detroit"

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DETROIT DIE SET CORPORATION

2895 W. GRAND BLVD. . DETROIT 2, MICH.



INCREASE PRODUCTION with Commander TION TOOLS

- * DRILLS UP TO 8 HOLES AT 1 STROKE
- * ADJUSTABLE TO ANY HOLE PATTERN
- # FITS ANY DRILL PRESS

of service, thousands of MULTI-DRILLS are cutting costs and increasing output up to 800% wherever metal, wood or plastics are drilled.

design and ruggedly built for years

You can drill 2 to 8 holes at one stroke

of a MULTI-DRILL equipped drill

press. Instantly and easily adjusted

to any hole pattern . . . compact in

Get these COMMANDER DRILL CHIP BREAKER

benefits now:

- Faster Drilling
- Deeper Holes
- Better Holes
- Longer Drill Life Safer, Cleaner Work
- . REDUCED DRILLING COSTS

Write for Catalog No. 851 and the name of your nearby Commander Distributor.

See us at Booth No. 531. National Metal Show. Philadelphia





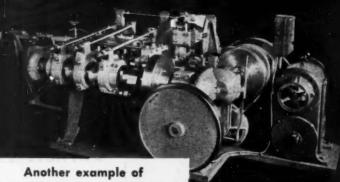
COMMANDER TAPPER

- ★ 1 Tapper Handles Taps #0 to 3/4"
- * Automatically Sensitive. Any Operator Can Do Precision Tapping
- * Fits ANY Drill Press

Commander Tappers "think for the operator"-automatically stop when taps are dull, overloaded, or when they strike bottom in blind hole tapping -permit faster tapping, better work, even with inexperienced operators. Torque control provides positive tap protection from #0 to ¾ "...spring clutch eliminates slippage, assures smooth, quiet, easy operation.

ummander MANUFACTURING CO. KINZIE ST. . CHICAGO 24, ILL.

with NILSON 4-SLIDE Machine!



Another example of FASTER, LOWER COST FORMING of Ribbon Metal Stock

180 Terminal
Contacts
Per Minute
Per Minute

Eliminated



A famous national manufacturer tripled production of the Terminal Contact illustrated above (in actual size) and reduced production costs proportionately by replacing several progress die set-ups with one Nilson \$-3-F four side machine. Seven separate operations were eliminated; 180 completed contacts produced per minute. Time required for tooling changes was reduced 50% over similar type machines.

This example clearly shows the big savings you can make in overhead, maintenance, labor and time with a Nilson 4-slide!

Taking stock directly from the coil. NILSON metal ribbon stock four-slide machines automatically feed, straighten, pierce, blank, swage, stamp, coin, cut off and perform up to five forming operations with speed and accuracy. Built in five models with capacities up to 212" wide and feed lengths up to 15". For specific recommendations on your wire and ribbon metal forming problems, send details, prints or samples of your operation to us when you request the bulletin.

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Specialists in Wire Forming Equipment for Over 50 Years

THE A. H. MILSON MACHINE COMPANY

OTHER NILSON PRODUCTS:

- · Automatic chain-making machines
- · Automotic stople forming machines
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- · Wire straightening equipment
- . Slide Feeds for Presses

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THAT'S EASY

THERE'S NO DETROIT POWER SCREWDRIVER



- Now—more than ever—speed in production is the order of the day—and D. P. S. Power Screwdrivers provide a wonderful contribution to present-day industrial needs . . . They are a "must" wherever the program calls for production assembling . . . They afford a tremendous gain over obsolete, slow hand methods. Detroit Power Screwdrivers will drive screws—any kind of screws—as fast as one as econd.
- Get our Catalog NOW, describing POWER SCREWDRIVERS, MOTORIZED HOPPER UNITS, NUT DRIVERS and SPECIAL ASSEMBLING MACHINES. Write today. Also send sample assembly for production estimate.

DETROIT POWER SCREWDRIVER CO.

2809 W. FORT ST.

DETROIT 16, MICH.

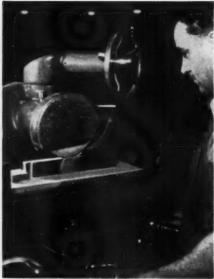
NEW Flexible Sealing... T-J AIR CYLINDER

Designed with revolutionary application of





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cylinders, segments and discs unbeatable for fast, cool cutting action. Use 32 and 38 ALUNDUM abrasive on all hardened steels and CRYSTOLON abrasive on gray iron and non-ferrous metals.

NORTON BRINGS YOU More types of abrasive products...for More

INTERNAL GRINDING. Being identical in grinding action, Norton New-Process wheels can be changed without machine adjustments. That and uniform top performance make them valuable production boosters. CUTTING-OFF. For wet or dry applications, high or low speeds, on any material, there's a Norton wheel in ALUNDUM or CRYSTOLON abrasive that's "made to order" for fast, economical cutting-off.







TOOL AND CUTTER GRIND-ING. Norton New-Process wheels bring you unequalled uniformity, identical wheel performance and longer, more even wheel wear. Use 32 ALUNDUM* abrasive on carbon and alloy steels, CRYSTOLON* abrasive on cemented carbides.

ROUGH GRINDING. On your swing frames, floor stands or portable grinders, Norton wheels "hug that work," to cut time and costs. And Norton Reinforced Hub Weels are the safest, most versatile ever made.



BARREL-FINISHING. ALUNDUM tumbling abrasive, being all aluminum oxide, cuts without glazing, has the hardness and toughness to stand repeated use. It's the abrasive that assures real precision-finishing.



POLISHING AND LAPPING. ALUN-DUM grain comes in surface treatments and grain sizes for best results on every polishing job you do. And precise sizing makes ALUNDUM and CRYSTOLON abrasives favorites for even the fussiest lapping jobs.

MOUNTED WHELS AND POINTS. Hundreds of sizes and shapes for smoothas-silk cutting action, with no bounce or vibration. Factory-trued on their own spindles to eliminate breaking in,

savings...on More jobs

The Norton line of abrasive products offers you more choices than any other. And Norton Research makes sure that every Norton abrasive product will deliver top performance on the work it is designed for.

That's the combination of quality and efficiency that will cut time, labor and costs on every grinding job you do.

SEE YOUR NORTON DISTRIBUTOR

He knows Norton abrasive products — and you'll find that his aid in selecting the right ones for your jobs is a real short cut to better, lower cost grinding... NORTON COMPANY, Worcester 6, Mass. Distributors in all principal cities. Export: Norton Behr-Manning Overseas Incorporated, Worcester 6, Mass.



Making better products to make other products better

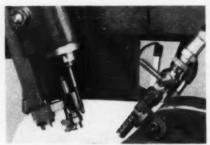
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At Last! A Way To Get Uniform Rake Angles On All Taps

The difficulty of regrinding a once-accurate tap to its original rake angle is often responsible for low production per tap and excessively high tap costs. Grinding other taps to the same uniform rake angle has also presented a problem.

A METHOD OF PRECISION SHARPENING

There is, however, one method of sharpening both old and new taps precisely to provide one uniform rake angle the one which is desired. These excellent sharpening results can be obtained by regularly using the Blake Flute Grinder and the Blake Chamfer Grinder for all your taps. These are the only two machines on the market today that enable you to grind your taps to such true-cutting accuracy. With Blake equipment you can sharpen each tap precisely to provide not only for uniform rake angles on each cutting edge, but also for uniform spacing of cutting edges and accurate chamfers. The Blake method of precision sharpening results in much longer tap life, greatly reduced tap costs, and more accurate finished work.



THE HEART OF PRECISION SHARPENING! Photograph shows close-up of tap positioning mechanism of the Blake Flute Grinder.

READ THE FACTS NOW!

For a detailed explanation of the benefits of precision tap sharpening, write us for the recent *Machinery* article, "Why Taps Should Be Sharpened Precisely". It may prove an eye-opener! Descriptive bulletins on both Blake machines are also available at your request.

IT'S A FACT! YOU CAN REDUCE YOUR TAP COSTS 50 to 75% by installing Blake tap sharpening equipment and sharpening your taps as you do other metal cutting tools.

PUT THIS COST-CUTTING COMBINATION TO WORK FOR YOU NOW!



BLAKE CHAMFER GRINDER
(Described in Bulletin 551)
(Described in Bulletin 651)

ACCURATE, TRUE-CUTTING TAPS
LESS TAP BREAKAGE
600% MORE PRODUCTION PER TAP
UP TO 75% REDUCTION IN TAP COSTS

Write for details about both machines!

EDWARD BLAKE COMPANY 440 CHERRY ST., WEST NEWTON 65

BLACK DIAMOND PRECISION DRILL GRINDERS . . . WALTHAM CUTTER SHARPENERS . . . SURFACE FINISH STANDARDS



MOTO-TOOL Kl1 NO. 2 contains 23 accessories, including high-speed steel cutters and Model 2 Moto-Tool in natural finish hardwood case ...\$23.50

MOTO-TOOL No. 2, with one emery wheel point\$16.50

Dremel HIGH-SPEED STEEL CUTTERS and balanced wheel points are available for all makes of hand grinding tools. Write for literature.

Dremel Moto-Tools are time tested—have been widely used in industry for over fifteen years. A veteran of World War II, Moto-Tool served in war plants and at military maintenance bases throughout the world. Thousands of these mighty midgets helped to make the atomic bomb—were used to establish production records in defense industries during the last war, Hundreds of toolroom and production line operations, such as polishing and grinding dies, burring parts, marking tools, sharpening cutters, touch up jobs, etc. are accomplished in seconds, without tearing down "set-ups." Moto-Tool is sturdily constructed for long lasting industrial service. Weighs only 13 oz.—dynamically balanced for vibration-less operation.

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FOR FASTER PRODUCTION, BETTER WORK, LOWER COSTS-

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Large Hollow Spindle Type



Both Illustrations Show the 18" Hollow Spindle 716" Hole

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- * Machine long work chucked through spindle.
- * Machine work between centers.
- * Also built with beds and carriages on each end of headstock for machining both ends of a shaft at one time.

SIZES 18" TO 36"

Small - 18" & 20" up to 716"

Medium - 25" up to 12" Hole Large - 32" & 36" up to 1614" Hole

(Standard Type Lather 16"-36")

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Hydraulic clutches for forward and reverse, controlled from apron or headstock.

Hydraulic brake for close position control.

Hydraulic clutches self-compensating. No adjustment and full power capacity at all times.

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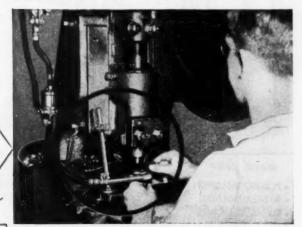
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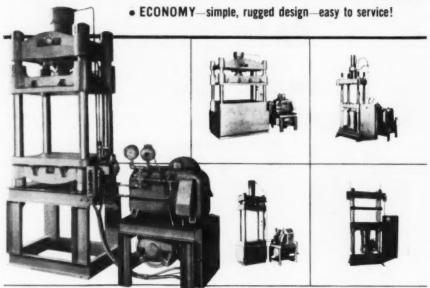
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GRAND HAVEN, MICHIGAN, Send for Illustrated Catalog





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and tool
grinder
does so many
jobs so fast
...SO Easily!

FOR GREATLY INCREASED VERSATILITY

the wheel head of the Norton No. 20 Cutter and Tool Grinder can be tilted up to 15° above or below horizontal, and swivelled through 360°. This simplifies such difficult jobs as grinding taper reamers, step counterbores, form tools and milling cutters.

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Remember — Norton offers you the longest experience in both grinding machines and wheels to help you produce more at lower cost. Investigate how the No. 20 can modernize and speed up your tool and cutter grinding. See your Norton Representative for details—and ask him about Norton Cutter and Tool Grinders Nos. 1 and 2, and the Bura-way Grinder for automatic lathe tools. Meanwhile, write direct for Catalog 189. NORTON COMPANY, Machine Division, Worcester 6, Massachusetts.

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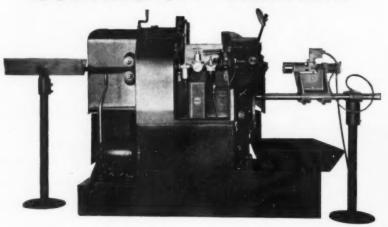


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Cuts Off Tubing Pipe and Shafting . . . FAST

Cuts off longer pieces than a regular automatic machine. In fact, cuts off any length you want—and cuts it faster. If your production requires quantity cuttingoff of tubing, pipe or shafting, check the figures below against your present time.

1/2" Tubing

long at the rate of one every 2.5 seconds.

These popular, time saving machines are now available in four sizes, handling work up to 634" O.D. Their many cost cutting features are described and illustrated in our latest catalog that will be mailed promptly on request.

11/4" Cold Rolled

rate of one every 20 seconds. one every 3 seconds.

This machine cuts off and This machine cuts off and the machine cuts off and the chamfers both outside edges of 1/2" .030 wall tubing, 5" cold rolled 20" long at the cot 3" long at the rate of cold rolled, 20" long, at the of 3" long, at the rate of

Threaded Studs



Cut and chamfered at one time-in 8 seconds from 10 ft. length of stock already threaded, (¾"
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MODERN MACHINE TOOL CO.

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\$67 20

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Designed to handle a large variety of items or parts. Three steel shelves with 1" flanges all around. Floor clearance 9½". Overall height to top shelf 42½", top of table 50". 44" long, 20" wide. All steel welded construction. Semi-crated approx. 190 lbs.



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Handles sheet steel bundles, any size 0" to 9" thick, 18" to 48" wide and any length.



For handling open and closed steel drums in vertical position, by crane or hoist. All-steel, with heavily welded chain. Sure-hold safety barrel grip. Saves plant space. Use for either high or low ceiling condition.

When Ordering—Always give "item" number. All prices are f. o. b. Detroit. Prices are subject to change without notice. Write for Catalog.

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\$7020 \$6775



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Use anywhere heavy loads are moved and rubber tired wheels are desired. 54" long, 28" wide, 42" high at handle. Top of platform 14" off floor. Welded construction. Heavy 3/4" plate. Two swivel wheels at handle end. Approx. wt. 300 lbs.

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A barrel tilt for controlled, precisid dumping or pouring, Ideal for chem cals, solvents, powders, etc. Turt 360° through worm drive.

Equipped with two safety type locking devices and all-steel, welded yoke. Hand-operated chain drive



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Reinforced heavy sheet steel, ½ cubic yard capacity, two 8" semi-steel wheels and two 4" metal swivel casters. Wt. 125 lbs.

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Group B—½" shank for the 5 series and ¾2" shank for the 4 series. Mandrel lengths for all groups 1½".

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List-\$1.40

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Convince yourself — test them in your own plant. See for yourself how much faster, cooler-cutting and longer-lived these outstanding wheels are.

Chicago Wheels are exclusively guaranteed to remain permanently mounted for life.

Chicago Mounted Wheels are available in a wide variety of special treatments for grinding magnesium and other low tensile alloys.

For every grinding, cutting, and finishing operation.

Whether it's Grinding Wheels, Internal Wheels, Cut-off Wheels, or Mounted Wheels, Chicago Wheel is the name to remember.

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There is a Chicago Grinding Wheel for every portable tool operation.

Exclusive . . . new 79E Bond gives you a 5% to 10% boost in grinding and finishing output. It's impervious to water, acid, oil . . . tougher construction to resist breakage . . . lowers down-time.

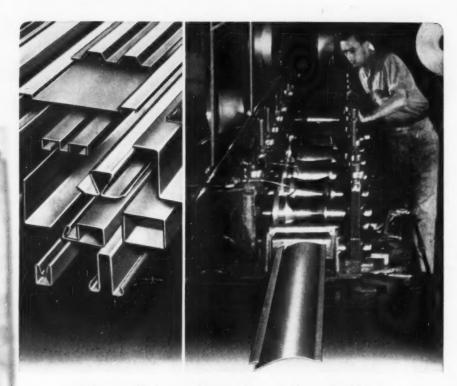
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Metal Lumber by the Mile!

Not only rough but finished "lumber," mouldings and trim, are made in an endless stream on a Yoder Cold Roll Forming machine, from coiled metal strip.

The photo shows the production of siding by Kaiser Aluminum and Chemical Corporation, Oakland, Calif. The strip goes in at one end, is perforated and formed, coming out at the other as finished siding, automatically cut to length, ready for installation. As a matter of fact, almost anything that can be made from lumber can now be made more accurately, better and more cheaply from metal, by this method. Plain steel

angles, channels and Z's up to ½" thick, take the place of conventional framing lumber. More intricate shapes, combining structural strength with decorative value, serve for mouldings, panels and trim.

Billions of feet are now made annually on Yoder machines, owned by manufacturers of buildings and their components, furniture, electric appliances, automotive equipment, etc.

Yoder book on the function, scope and economics of Cold Roll Forming, sent on request. Consultations and estimates for the asking.

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Complete Production Lines

- * COLD-ROLL-FORMING and auxiliary machinery
- * GANG SLITTING LINES for Coils and Sheets
- * PIPE and TUBE MILLS-cold forming and welding





NEW BALDOR W-I-D-E clearance grinder

The new BALDOR Streamlined grinder, 8200 series, is excellent for grinding long and odd-shaped pieces as there's plenty of clearance between the wheels and the motor frame.

It is recommended for grinding off metal burrs, weld seams, rust, scale, etc. Has 3-way adjustable tool rests to permit angle grinding, and is equipped with exhaust type guards.

 $^{1/2}$ h.p., 3450 r.p.m., capacitor-start, capacitor-run motor GUARANTEED 2 YEARS against burn-out. Complete, as shown, \$86.00.

ASK FOR BULLETIN 353

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Model J, 10" x 18" capacity. Available as a wet or dry cutting machine.



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PRODUCTION INCREASED 79.4% Part #1 .125 x 23/4" round steel rod. Turn neck, knurl, cut off. 540 pieces per hour

with conventional feed . . . 969 pieces per hour with Lipe AML Bar Feed.

PRODUCTION INCREASED 50.9%

Part #2 $\frac{1}{16}$ x 3" brass tube, $\frac{1}{12}$ " wall. Inside chamfer one end, square cut-off. Previous production 560 pieces per hour ... 845 pieces per hour with Lipe AML Bar Feed.

PRODUCTION INCREASED 108%

Part #3 1/2 x 161/4" steel rad. Form ends and chamfer. One of 14 different jobs on No. 00 B&S Screw Machine equipped with Lipe AML Bar Feed. Average gain in running time: 78%. Average gain in production: 108%.

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AUTOMATIC Magazine Loading

BAR FEED



Big Production gains on a wide variety of jobs because:

- Stock is fed to screw machine all the time — not dependent on operator.
- Feed-out pressure always behind
- Eliminates feed fingers.
- Avoids multiple feed finger feed-
- Gives maximum output of machine no "cutting air."
- Saves in changeover set-up time.

GUARANTEE

Lipe Automatic Magazine Loading Bar Feed will enable a screw machine to produce at least 90% of its gross production capacity.

Get full details on how a Lipe AML Bar Feed will increase your production and save money. Our engineers will gladly study your problem - no obligation. Write.



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Mow! A NEW CONCEPT IN POWER PRESS OPERATION

Pictured is Famco's 18-ton open-back, inclinable power press featuring the exclusive Electromatic clutch.

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Electromatic

18-TON POWER PRESS

Famco now offers the most fool-proof, small power press clutch ever designed—the solenoid operated, nine-point jaw clutch. The handy selector switch provides ready changeability from non-repeat single stroke to continuous operation-from on to off positions-plus, a neutral position which locks the clutch, making hand or foot controls inoperative.

The Electromatic 18-ton Power Press gives the greatest versatility and ease of operation, resulting in increased efficiency and production. For further details contact your nearest Dealer, or write for catalog.



amco (cosi) machines

FAMCO MACHINE CO., 3118 Sheridan Road, Kenosha, Wis.

CHECK THESE FEATURES

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- clutch for greater efficiency. ECONOMY Less maintenance; minimum production time losses. 3 SAFETY — Electrically controlled
- for safe operation, tooling. 4 LONG LIFE-Proved design, rug-
- ged, longer-lasting press. EASE OF OPERATION—Feather light foot or hand control.
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Six interchangeable points * Tapered seat * Very short overhang * Pre-loaded heavy duty bearings * Hardead and ground tool steel points * Accuracy of ± .0001 * Available in toolmaker's case



Sizes 1 to 5 M. T.

Three interchangeable points * Replaceable parts and bearings * Hardened and ground points * Precision combination bearings * Positive bearing seal * Sturdy, medium duty tool * Handles large variety of lathe, grinding and milling jobs



Sizes 1, 2 and 3 M. T.

Small diameter head * Shorter overhang * Accurate to .0001 * Free-turning point revolves with smallest parts where point of average live center will not turn * Minimum deflection due to rigid, one-piece point * Oilite bearing and ball bearing



21/4", 31/4", and 41/4" square

Twelve positions * Re-indexes to closest measurements * All working parts hardened * Simplifies and cuts set-up time * Achieves greater productivity and accuracy * Fully protected against dirt and chips * Fits all lathes



Spring Type: Finest, select steels Properly heat treated and precision ground Hard jaws Styles 3C, 3AT, 5C, and 6AT.

Step Type: 3" in diameter • Machineable for multiple steps or desired diameters • Holds work firmly • Styles 3C, 3AT, and 5C.



Complete with Collet Sleeve
Precision-built and engineered handwheel type * Extremely accurate
* Sturdy construction, finest quality
workmanship and materials * Polished
maple handle * Hollow torque tube extends through spindle * ½" capacity

See your local distributor or write today for literature.



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This expanded service enables you to quickly realize the plus value of Kennametal toolingdecreased cost-increased productivity. There's a Kennametal tool for your every need.

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tion, application, or maintenance-our field engineers are at your service.

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Featured in this issue

The Facts: Box Strapping vs. Friction Saw Bands	164
More About Cool Grinding	178
New Blue Book "Know-How" Reference Sheets	233

More About Cool Grinding. About a year ago the BLUE BOOK published information about atomized spray grinding, commonly called cool grinding. Since that time many experimental tests have been run and very interesting results have come to light. The tests and findings are reported. Page

Getting Along With People. by Edmund Mottershead, is this month's title to the Foremanship Forum. Nothing in life is as important as the ability to work and play with our fellow men. In this issue and some of the forthcoming issues Mr. Mottershead will briefly describe some typical workers and their faults and how the workers can best be handled. Page201

Materials Handling Plan Speeds Production at Cleveland Plant. by Robert S. Smith, This is a brief analysis of the new Reliance plant in Cleveland, Ohio. The new plant features the latest in materials handling thinking and planning. Some of these features are discussed by the author, who is a member of the manufacturing staff. Page

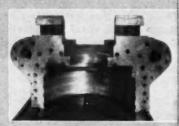
Milling Indexing Fixture With Quick Indexing Feature, by Robert Mawson. Page

Special Report on Drilling Machines. This is the 24th report in a series classifying and indexing the American machine tool industry. This instalment is part 5 of Drilling Machines. The accompanying article in this report deals with sharpening of drills. Also included are: description of late model drilling machines, and specifications of American-built machines. Page242

BICKFORD for big work...

This powerful Cincinnati Bickford Super Service Radial Drill was purchased to facilitate handling of "big work." It was the right machine for the job. In the complete line of Cincinnati Bickford Radial Drills, with their many outstanding features, is the right machine for you.

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AS THE



You cannot give a man strength and character

American machine tool experts cast critical eyes over the machine tools of the 2nd European Machine Tool Exposition held in Hanover, West Germany. Their opinions of European tools will be reported in the BLUE BOOK, for the nonce, examine the spectacular recovery of Western Germany.

Here, indeed, is food for thought!

Exemplify this resurgence by a typical case: Schiess AG., machine tool builders. Before the war they employed 5,000 workers in four plants in Duesseldorf. After the war the plants were dismantled and all valuable machines shipped to Russia and satellite countries. So thorough were the little red termites that buildings were razed for the structural steel in them, wire conduits ripped out of the walls, and rails torn up until nothing remained but a dirty pile of dust, brick and cement.

Within two years a new factory, employing 1900 workers grew out of the rubble, and began producing vertical turret lathes, boring mills, milling, hobbing machines and other machine tools.

Germany's entire production facilities were heaps of rubble, and while the damage due to war, systematic dismantling after the war, aided eagerly by the Russians who carted off everything whether bolted down or not, was enormous, the mental outlook and physical condition of the German was equally as dreary. A worn-out, beaten little fellow sitting dejectedly amidst a pile of bricks that was his factory.

And yet he's bounced back into a health sturdier than that of most Western European nations. While industrial production rose 40% in all of West Europe, his jumped from 100 in 1948 to 220 in the spring of 1952. Today his products are most earnestly to be reckoned with.

What caused this renascence? First, the Marshall Plan; second, the German currency reform of 1948 (an accompaniment of the Marshall Plan); third, national character.

Of Marshall Plan aid West Germany received 1.5 billions (one-tenth of West Europe's total aid); Britain and France each received about 3 billions. With this 1.5 billion the seed of reconstruction was sown. The Marshall Plan, from its inception, stressed a sound fiscal policy: controls over public spending, credits, and solvent currencies; consequently, West Germany has today one of the "hardest currencies" in the world. Here there was no tinkering with socialism or welfare states, but an irresistible urge to rebuild, to produce, to live, and to rejoin the family of nations in freedom and respect.

Some Western European countries have not yet reached financial solvency but still have outstretched hands: Western Germany's financial solvency has attracted foreign investments and private credits; she is no longer in need of further aid from the American taxpayer.

Whatever one may feel toward West Germany as a one-time enemy, and now as a competitor in the world's markets, there is one thought Western Germany underlined in bold strokes, a thought that many West European nations—yes, and many American Welfarers—should ponder: you cannot give a man strength and character, you can only awaken it. That's the philosophy on which the Marshall Plan was founded.

William 7 Schleicher

70 feet per minute

120 feet per minute

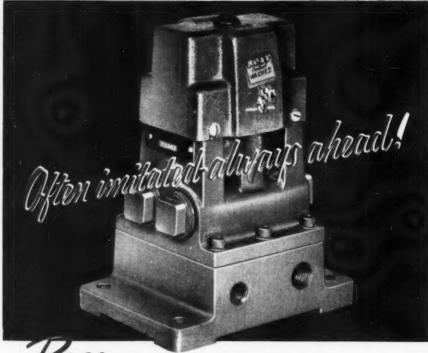
I Vroaching compressor wheel slots

per minute - with a return stoke of 120 feet per minute - is a practical reality at Detroit Broach. broach-engineering experience . . . a combination forged by years of creative engineering Broaching intricately formed slots in aluminum compressor wheels at a speed of 70 feet This great broaching advancement is the result of imagination and sound

Whether your application involves a new concept in broaching or the simplest type broaching economy and dependable tooling when you call on Detroit Broach. of conventional broaching, these same factors will benefit you in terms of

and manufacturing of broaches and broaching tools exclusively.





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- Positive seal poppet construction;
- Easy mointenance—only a few moving parts; bodies interchangeable without removing piping
- Many modifications—vacuum, air, and liquid service; various pressures; AC or DC solenoids; momentary contact



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LAST MINUTE WASHINGTON NEWS



by Arnold Kruckman Washington Correspondent



Late in August members of the machine tool manufacturers Industry Advisory Committee were painfully frank with officials of the NPA over their apprehensions about the downturn in new orders. It was brought out operation of some companies is being maintained on backlog orders alone. Industry spokesmen said unless new orders are forthcoming many companies face slowdowns and eventually will have to close. It was agreed the decline was due principally to a reduction in appropriations to the Military Services, particularly to the The industry made no bones about Navy. the fact that it viewed the whole

situation with much alarm, and emphasized that it is a trying condition when the industry itself is constantly being pressed to expand its productive capacity to meet emergency needs in national defense. NPA recorded that backlog orders on May 1, 1952, totaled about \$1,389,000,000; and on August 1, 1952, \$1,280,000,000. Production in the industry is about \$100,000,000 a month. Everyone agreed that something must be done, but no one in the Government group had any definite ideas, nor had they an answer to the suggestion that some fixed level of production capacity should be set up for a specific time.

It was suggested New England must shift to new production, and that this situation should spell a great demand for new

machine tools.

Others pointed out that the recently modified M-41 order, which allows the industry to make all but nine items, should be helpful under the existing circumstances. It was particularly underlined that the modification of M-41 should give the industry an opportunity to recapture the export business which has

been slipping away.

Senator John Sparkman's Small Business Committee sat in the discussion and pointed out conditions have changed in the last six months to such an extent that many machine tool manufacturers, particularly small ones, already have been forced to curtail production for lack of orders of any kind. Senator Sparkman seemed to think there had been a great deal of fumbling and very bad management involving all the defense agencies, in the Pentagon, as well as in those located in Washington.

NPA removed machine tools from Direction 4 to CMP Regulation 3, leaving machine tools subject to other NPA orders. NPA emphasized Direction 4--which applies as a special preference

status of certain DO rated orders--may not be construed to apply to any product subject to M-41.

OPS will issue a general order to permit manufacturers who process steel, aluminum and copper to pass through, at each stage of fabrication, the increases in ceiling prices recently authorized. Primary processors will be permitted to reflect immediately in their ceiling prices the exact amount of the cost increases. Manufacturers will, in turn, be permitted to pass on such cost increases through to the final end product. There will be two general methods to calculate adjustments. First, cost increases for each commodity may be calculated separately on the basis of increases incurred for metals used in that individual item. Secondly, a manufacturer may calculate an adjustment factor which will represent the average increase for a group of commodities. Provision will also be made for integrated companies which themselves manufacture the primary metals and also process them further into semi-manufactured products or end products.

Controls on second-quality steel have not been relaxed and second quality steel is still subject to all the regulations of a CMP material. Consensus among the iron and steel scrap industry and the iron and steel scrap consumers industry is that an ample scrap supply is available to meet the present demand, and that steel mills now have the highest scrap inventory on record. The industries are opposed to the export of scrap from continental U. S. NPA has authorized steel consumers to acquire foreign and used steel, free of allotment restrictions of the CMP. The administrator of NPA asked the steel industry to supply its compliance of icers with information about users who are accumulating excessive inventories of steel so that they may be prosecuted.

To save time, money and paper work for both industry and Government, NPA announced the creation of an automatic allotment procedure designed for 10,000 manufacturers of "B" products beginning in the first quarter of 1953. This means these producers may calculate their own allotments and obtain necessary priority assistance for controlled materials without submitting CMP-4B applications.

As of September 8 competition between Defense Services in procurement, production, warehousing and distribution of supplies and equipment, is to be halted by a series of orders issued by Defense Secretary Lovett. If the orders actually accomplish their purposes, one office will be the sole procurement agency for all four major Services and for the fifty or sixty subordinate parts of the Services which now buy independently and compete with each other, and compete with all other agencies and offices of the Federal Government. Also it means they will use warehouses in common instead of building warehouses side by side holding identical items--warehouses that generally are half empty and could easily store commodities for all Services. It will also reduce transportation costs when requirements are close at hand and need not be shipped from some distant point where the particular Service has its nearest



.now in two styles

NUT TYPE

Is secured in shoe by tightening nut on end of bushing. Nut is located in counterbore in shoe for flush assembly.



The bushing that gives you the long-wearing features of hardened steel yet provides the seize-free, rmance of soft bron score-free perío is now available in the two styles at the left.

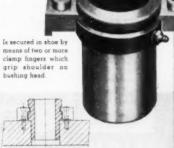
The Lamina Guide Bushing is hardened steel with free-running bronze electroplated on the inside diameter. A 1/2" oil groove further lubricates the inside of the bushing in a double figure-eight pattern.
Ordinary grease is fed to the groove through a standard Alemite fitting.

In addition to the improved wearing qualities of the Guide Bushings. Lamina Guide Pins give longer service, too. Made of waterhardening tool steel, these pins eliminate the brinelling and "mushrooming" characteristic of case-hardened pins when driven into the die shoe

> Both styles of these bushings are stocked in a variety of lengths and diameter for straight, shoulder and removable pins. Lamina Dies and Toels, Inc., 14925 W. Eleven Mile Read, Betkley, Mickiess.



means of two or more bushing head.



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warehouse. Moreover, all Services at a base or post will be required to use the same laundries and bakeries instead of building one separately for the personnel of each Service. And finally, it will reduce the number of buildings required, saving money for materials, equipment and labor.

The price stabilization program to be followed in the next several months has been tentatively mapped out and proposes to "go forward positively with controls where required by economic conditions and where permitted by law; to improve the administration of controls that are continued with a minimum burden on business; to limit ceiling price increases to those required by law or by fairness and equity, and to reduce established ceiling prices where appropriate and clearly justifiable; to suspend controls which are not currently serving a useful stabilization function; to make plans to meet any new inflationary crisis."

OPS, lacking funds, has cut its staff from 12,000 to 5,850. It suspended from price control experimental metals and metal alloys. Privately, friends in OPS doubt whether there will be much decontrol of a policy quarrel that is raging with the

Agency.

In a report to the President, Dr. John R. Steelman predicted approximately 4,000,000 production workers in the metal working industries will be temporarily unemployed in the coming months for lack of steel. He anticipates the number will include some of the 24,000 ordnance workers, 33,000 making metal furniture, 37,000 iron and steel-forging workers, 780,000 who make various fabricated metal products. Also in this category are 1,275,000 workers in plants making machinery, and 675,000 making electrical machinery.

The latest Labor Department report emphasizes jobs hardest to fill are those for machinists, tool makers, die sinkers and setters, workers in machine shops and related occupations. They find 3,567 machinists are needed in twenty-five States, and that 41% of them are particularly needed in California, Pennsylvania, District of Columbia and New Jersey; machine shop and related occupations: 3,038 in twenty-nine States; tool makers and die

sinkers and setters: 2,636 in thirty-three States.

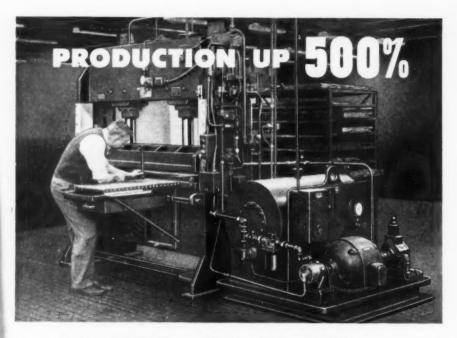
To facilitate the interchange of priorities assistance between this country and Canada, NPA amended NPA Regulation 3. The priority system of each country is made available to purchasers in the other under the terms of the "Statement of Prin-

ciples of Economic Cooperation."

Wylie F. McKinnon has been appointed Director of RFC Office of Tin and Fiber. The new office will be responsible for RFC purchases and sales of tin ore, concentrates and refined tin, and for the operation of the corporation's tin smelter at Texas City, Texas. Edward P. Chapman was appointed Chief of the Tin

Division in the Office of Tin and Fiber.

SDPA states expansion goals for the machine tool industry, set by DPA, is for \$125,000,000 additional capital investment by January 1, 1954. SDPA has established the small business share at 30%. For cutting tools the expansion goal is for \$30,000,000 additional capital in added production capacity by July 1, 1953. SDPA has established the small business share at 49%. For dies, jigs and fixtures the expansion goal is \$33,000,000, with 49% the small business share.



KRW HYDRAULIC PRESS UPS ASSEMBLY OUTPUT 500% AT HOPE'S WINDOWS INC.

The KRW press shown above is curing a big headache! Originally, because of the precise nature of the work, one of the most important assembly jobs at Hope's Windows, Inc., Jamestown, N. Y., was a hand operation. It was slow, painstaking work and held up production of completed Hope's windows. Then the company tried the job on a mechanical press. This didn't work out because the stroke was much too long and, of course, could not be adjusted. Finally, Hope's found the perfect answer to their problem in this 60 ton, 2 cylinder KRW Hydraulic Press.

They set the stroke to 11½"—just what they needed. Result? Every assembly job is perfect and production has increased five-fold. The KRW Press cost 2/3 less than the mechanical press that would do the same job—AND the KRW Press can be used extensively for other production jobs through a simple stroke adjustment! Any pressing problems in your work?

Bring them to K. R. Wilson for fast, low-cost solution. One, two and three cylinder models; 25 to

Bring them to K. R. Wilson for fast, low-cost solution. One, two and three cylinder models; 25 to 150 ton capacities; hand operated, air operated or motor driven. Or, if you need a custom-designed press, we'll build it for you.

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Hows

A BUSINESS



Aluminum, copper supply improved

Existing supplies of aluminum and copper are presently sufficient to meet all the important needs of both national defense and the civilian economy. Copper supplies have improved to the extent that most of the formerly prohibited uses are now permitted, and allotment percentages have been increased.

Aluminum should be in easy supply by January 1954, despite delay in completion of new facilities, and the over-all loss of as much as 100 million pounds, caused by the recent steel strike.

Contracts for new jeeps

The first exhibition of a new Jeep having greater cruising range, more power, improved maintenance, and other advantages over the preceding model, was displayed by the Army's Ordnance Corps at the Aberdeen Proving Ground.

The new model will be produced under a contract amounting to about \$200 million.

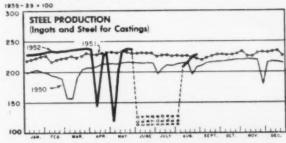
The new Jeep has a 72 h.p. engine (F-head) producing 20% more power than prior designs and operating on 25% less fuel.

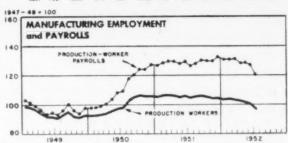
Appliance industry in poor shape

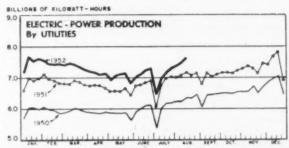
According to NEMA (National Electrical Manufacturers Association), domestic sales billed by 26 manufacturers of housewares during the first half of 1952 were \$39,905,-352. That's a long way from the \$67,131,-

General business indicators

source: U.S. Dept. of Commerce







803 billed by the same companies in the same period of 1951.

Rubber bouncing back

In contrast to the appliance market, which is a bit sleepy, the rubber industry is back on its bounce again. The steel



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MATERIALS - STEEL and CARBIDE
ACCURACY - FOR STANDARD and SHOP

AVAILABLE IN A WIDE VARIETY OF SETS OR INDIVIDUALLY AS REPLACEMENTS FOR WORN BLOCKS

*TOLERANCES					
Block Sizes	Standard Sets	Shop Sets	Block Sizes	Standard Sets	Shop Sets
1" and under (per block	+.000004 - 000002	+ 000004 000006	10" to 12" (per inch)	+.0000025 0000015	+.0000025
2" to 4" (per inch)	+.000004	+ 000004	16" to 20" (per inch)	+ 000002 - 000001	+.000002 000002
5" to 8" (per inch)	+ 000003 - 0000015		Flotness Toleronce Porollelism Toleronce	.000004	.000004 .000004

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HOKE and USA GAGE BLOCK SETS. USA Set No. 88 is shown above, HOKE Set No. 81 in lower left-hand corner.

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CARBIDE WEAR BLOCKS

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for use with HOKE and USA Gage Blocks. Tolerance on flatness and parallelism is .0000; Blocks will wring to either surface.



MIKECHECKS are made of same steel and by same process as Hoke Blocks. The set is contained in a chromium plated case and consists of five sizes: .1, .2, .3, .5 and 1.000 inches.

strike—rubber is closely allied to the steel index—did not affect the rubber industry as much as was believed. While 1952 business to date is lagging behind the same period in 1951, rubber people believe that the balance of 1952, and next year, will show definite improvements.

Between 18 and 20% of industrial rubber goods are finding their way into the defense program. A year ago the amount of rubber in the defense effort was only 10%.

End of steel strike

The end of the steel strike has set off a pent-up demand which may surpass anything heretofore delivered by the steel companies. The race may bring the world's greatest output of steel daily, weekly and monthly in the latter part of this year after high level output is eventually regained. Record high production is likely, barring raw materials shortages and new labor controversies.

An annual production record cannot be achieved this year because of the loss of 17,000,000 tons of ingots and steel for castings in the wage controversy in April, May, JJune and July of this year.

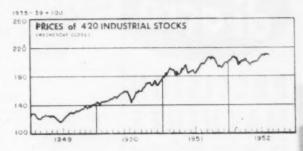
\$220,000,000 provided for 31 projects abroad

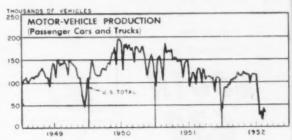
In four years after the start of the Marshall Plan in 1948, the United States furnished nearly \$220,000,000 for 31 iron and steel projects in Marshall Plan countries, according to figures recently obtained in Washington.

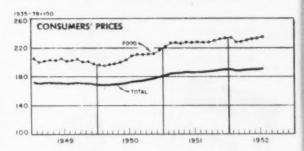
The total cost of the 31 projects was estimated originally to be around \$864,000,000. Thus, ECA-MSA funds accounted for about one-quarter of the total cost. The rest of

General business indicators

source: U.S. Dept. of Commerce







the money was put up by the individual countries. The projects were principally finishing plants rather than steelmaking facilities. However, the figure for U. S. funds' is on the low side, since it covers only the major projects, and since it does not include indirect purchases of equipment or materials.

Europe's steel recovery and its future production rate

Recovery from the war's dislocations in Europe is gradually redrawing the inter-

diacro

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WORLD STEEL PRODUCTION AND CAPACITY ESTIMATES

WITH ESTIMATE FOR 1953 OUTPUT

Thousand of Net Tons of Crude Steel - Add 000

		Annual	Estimated	
	Output	Jan. 1	, 1952	Output
	1951	Tons	World %	1953
United States	105,140	108,592	43.69	117,700
Canada	3,567	4,409	1.78	4,950
Latin America, 4 countries1	1,814	2,067	0.83	2,772
Total 6 American countries	110,521	115,068	46.30	125,422
United Kingdom	17,516	20,062	8.06	19,800
France	10,836	11,299	4.55	10,000
Saar	2,867	3,031	1.22	16,280
West Germany	14,884	18,739	7.54	15,950
Belgium	5,516	5,787	2.33	6,050
Luxemburg	3,393	3,582	1.44	3,520
Sweden	1,657	1,929	0.78	2,255
Italy	3,362	3,858	1.55	3,410
Other Free Europe ²	3,664	4.136	1.67	4,774
Total Free Europe	63,695	72,423	29.14	72,039
Japan	7.167	9.094	3.66	7,590
Other Free Asia, Africa ³	4.330	5,126	2.06	5,610
11 Small Countries4	209	303	0.12	0
Total Miscellaneous	11.706	14,523	5.84	13,552
Russia	34.502	34,722	13.97	41,470
Satellites ⁵	10,088	11,795	4.75	13,750
Iron Curtain Total	44,590	46,517	18.72	55,220
Est. World Total	230,512	248,531	100.00	266,453
1.	200,012		1 1 1	

¹Argentina, Brazil, Chile, Mexico; several small countries not included.

²Austria, Netherlands, Norway, Switzerland, Turkey, Finland, Spain, Yugoslavia.

³Australia, India, Union of South Africa.

Colombia, Peru, Uruguay, Venezuela, Denmark, Ireland, Portugal, Thailand, Algeria, Morocco.

5Czechoslovakia, E. Germany, Hungary, Rumania, Poland; data on Far Eastern satellites unknown but capacity small.

⁶Probably well above 352,000 tons but not estimated for several countries. Sources: 1951 output and 1952 capacity from Iron and Steel Division, NPA.

Output for 1953 estimated by United Nations in report dated April, 1952.

national steel map. Germany, which was the largest steel producer in Europe before the war, is recovering rapidly from an almost complete cessation of production at the end of the war, and is now rivaling the United Kingdom. The latter, in 1948, was the first major country to establish a production record after the war. More recently the United Kingdom's output has slowed down so that now it is being crowded by the production of Germany and the combined production of France and the Saar.

Steel capacity and production are being

increased substantially in many countries, as shown in table above.

The United States, which recently has produced around 46 per cent of world steel output, would produce on the basis of these data, shown in above tables, 44.1 per cent in 1953. The capacity in the United States continues to be more than double the combined estimated capacity of Russia and her satellites. Although the United Nations said it made its estimates of 1953 production on the basis of "known plans," no official estimate of output has been issued by steelmakers in this country. Foreign plans may also be changed.



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Here's a spark tester checking bars of Ryerson alloy steel. By reading the spark pattern thrown off when each bar is touched with this whirling, abrasive wheel, the tester determines the steel's analysis. In this way he verifies quality guards against mixed steels.

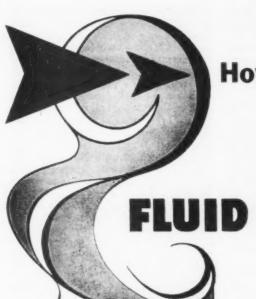
Spark testing is only one of many steps in the Ryerson Certified Steel Plan for safer alloy buying—a plan especially important to you today, while restrictions are enforcing the use of leaner alloys with unfamiliar heat treatment response. We also put every heat of Ryerson alloy steel through four hardenability tests, recording the results on a Ryerson Alloy Certificate which goes with the steel. These tests enable you to buy Ryerson alloys on the basis of hardenability as well as analysis—the safest way under today's changing conditions. And the test results guide your heat treatment.

So order from Ryerson where you can specify hardenability and be doubly sure. Stocks are out of balance, but we can usually take care of your needs.

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How you can use

FLUID POWER

Part 5

Dual pressure circuits

by H. L. Stewart, Logansport Machine Co., Logansport, Indiana

WITH THE NUMBER of applications for hydraulic equipment skyrocketing every year, the pressures required to perform the most satisfactory work in any circuit may vary greatly in different parts of the circuit. Of course, this will depend largely on the work to be done and the complexity of the installation. A good example of this is on large automatic machines where the work piece is clamped by a light weight hydraulic cylinder and the work performed must be done by a high pressure hydraulic cylinder. If both cylinders were to be operated at the same pressure, the clamping cylinder would necessarily be impractically small or the heavy duty cylinder must be of a diameter that would be too bulky to fit into the installation. Also, the volume of oil supplied to a very large hydraulic cylinder may be impractical. In order to eliminate such operating conditions and make the installation as compact as possible part of the system operating at one pressure and another part at a higher pressure is ideal. By using the two or more pressure system, heat, wear, and leakage may be reduced to a minimum and better service life may be expected from the valves, cylinders and the power unit.

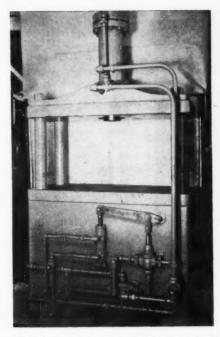
Many methods may be employed to obtain two or more working pressures from a single circuit. This article will discuss several successful methods that are now being used. These methods include pressure reducing valves, individual high and low pressure pumps, combination pumps with changeover valves, cam operated relief valves and pressure intensifiers.

Probably the most common and easily constructed dual pressure system is one using a pressure reducing valve. Pressure is reduced as the oil flows thru the valve. Pressure regulation is obtained by the adjustment of the tension on the spring. As the tension on the spring is increased, the pressure on the low pressure side of the valve is decreased. A pressure differential from the high pressure side of the valve to the low pressure side of the valve may be as great as 10 to 1. If a greater pressure differential is desired, often two reducing valves are connected in series. For compactness of design some hydraulic pressure reducing valves are constructed with built-in check valves for free flow return. When installing pressure reducing valves in a circuit, it is very important that any drain lines on these valves be connected to the sump. Failure to do so will create a back pressure in the valves and make them inoperative.

A circuit employing a power device with the two pumps set at different pressures provides ideal conditions for many installations. These pumps may be either separate units connected to a double shaft electric motor or a combination unit built into one housing and connected to a single shaft electric motor. Which type is used doesn't matter as far as hydraulic operating features are concerned. The relief valve connected to each pump controls the operating pressure of that portion of the system where each valve is located. Oil passing thru relief valves creates heat which will be in proportion to the pressure and volume.

Where a small volume of high pressure oil is required for clamping and a large volume of low pressure oil is required for the work cycle, a small volume pump at high pressure used on the clamping portion of the circuit and a large volume pump at low pressure for the work cycle portion will reduce heat, packing leaks and oil breakdown. The dual pressure system will also allow cylinder selection that will fit into the installation. In the two pump system, volume control as well as pressure control is an important feature. When using a two pump system, a pressure differential between two sections of the system of fifty to one may be obtained by using a small pump operating at 5000 P.S.I. and a large pump operating at 100 P.S.I.

A dual pressure circuit designed around a hydraulic intensifier has numerous applications. The operating pressure of the main part of the circuit is set by the relief valve on the power device. The pressure put forth by the intensifier is determined by the area of the intensifier cylinder, the operating pressure of the system and the ram area of the intensifier. For example, a ten inch bore intensifier cylinder being operated at 500 P.S.I. from the main circuit and having a 2-3/4 inch diameter ram will produce an intensified pressure of 6700 P.S.I. Actually, the limitations of the maximum pressure differential are only set by the manufacturer's ability to manufacture larger diameter intensifier cylinders and and the ability to secure suitable packings. The volume of intensified pressure produced per cycle is dependent upon the bore and stroke of the intensified chamber. The intensifier may be either single or double acting depending pretty much upon the application. In many installations oil filler units are advisable in order to make up for any oil which may be lost in the closed



Multiple pressure press circuit in which press ram approaches work at low pressure; then as cylinder in lower section of picture is operated, the stem on relief valve is depressed and high pressure oil flows to top of press cylinder for the final squeeze on work piece.

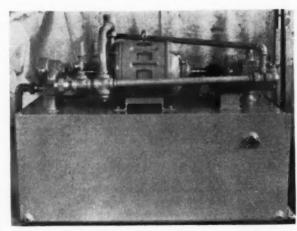
system by leakage. These units usually consist of an oil chamber open to atmosphere and a ball check valve connected between the oil chamber and intensified chamber.

The air operated hydraulic intensifier operates on the same principle as the hydraulic intensifier except that air pressure is used as the operating medium. Fast action and the elimination of a hydraulic power device are desired features of this setup.

Many high pressure testing installations make use of the dual pressure intensifier setup in which the test piece is held by low pressure hydraulically actuated clamps and intensified pressure is then forced into the work piece. Intensified systems work well on piercing operations.

Although extremely high pressures may be developed with intensifiers, high heat is not generated as in other methods of obtaining high pressures. The disadvantage of intensifiers of the single acting type is that the application must be completed before the intensifier ram reaches the end of the stroke or the intensified pressure will be lost. Although there has been some development with double acting and rotary type intensifiers, there are likely to be undesirable pulsations with these types.

By using two relief valves, a dual pressure system may be worked out that is beneficial for press work. One relief valve is placed on the power unit and the other is placed in the line between the four way valve and rod end cover of the press cylinder. The relief valve on the power unit is set at a pressure that is sufficient for the press cylinder to perform the operation on the work piece. The setting on the second relief valve is such that the power exerted on the return stroke of the cylinder is just enough to return the ram and whatever may be connected to the ram to the starting position. This allows the oil to dump thru the second relief valve at low pressure during standby periods thus eliminating the possibilities of overheating the oil. On installations where only a single relief valve is used and a large volume of oil is dumped thru the relief valve for long periods of time, it is quite likely that the oil will become so hot that all of the packings will leak excessively and break down. On such setups the oil has been known to boil and run down over the sides of the power unit tank. By adding the second relief valve, the trouble



Power device with two hydraulic pumps for dual pressure system.

was corrected but new packings in valves and cylinders were required as they became charred from the intense heat. Some press circuits are designed with an open center master control valve in which the oil is dumped back to the sump at no pressure during the standby periods, and the cylinder ports are blocked so that the press ram is held in the up position. The disadvantage of this setup is that if the die on the end of the press ram is extremely heavy and there is any leakage in the valve or cylinder, the cylinder will drift allowing the press to close at an undesired time.

By the use of a rather ingenious setup in which air, a combination of air and hydraulic, and hydraulics are used, a multiple pressure hydraulic system may be set up which is valuable for test work and press applications where the pressure must be varied a number of times during each cycle. The heart of this layout is a cam operated relief valve that can handle a wide range of pressures. By using a long cam with a very little rise connected to the end of the combination air and hydraulic cylinder, the stem of the relief valve is gradually depressed until the maximum pressure is reached in the hydraulic system. The combination cylinder can be stopped at any position of the stroke by merely using a three position air valve and shifting it back into neutral position, blocking both cylinder ports. It has been found that if a very small volume pump is used on the hydraulic power device, a slight fluctuation shows up on the pressure gauge which appears to be caused by the pulsations of the pump. It is not so noticeable on large volume pumps. The addition of a bladder type accumulator to the circuit to act as a dampener has overcome this condition.

On press circuits or other circuits which require a low approach pressure and a high pressure, the use of the high low pump with changeover valve is a simple solution. The large volume section of the pump operates at low pressure bringing the press ram down to the work at high speed; then when resistance is met the changeover valve automatically cuts out the large volume low pressure pump and cuts in the small volume high pressure pump for the work cycle. The two pumps may be built into one unit, including the changeover valve, or they may be two separate pumps connected with external valving. The principle of operation is the same on both. The only advantage of using two separate pumps is that there are a greater variety of pressures and volumes available.

By the use of this high-low system, there is a considerable saving in electric power consumed as well as a reduction in motor size. For example, a high-low pump delivering 12.6 G.P.M. at 300 P.S.I. and 1.8 G.P.M. at 1000 P.S.I. requires a 3 horsepower motor. To get the large volume and high pressure from a single pump would require approximately 7.5 HP.

Another advantage of this system is that very little heat is generated since the high pressure is only applied on the small volume of oil. The high-low system is not considered practical if the working stroke is long and must be completed at a high speed. If there are to be fairly long holding periods with the high pressure such as in molding applications, excessive internal cylinder and valve leakage must be eliminated or the low pressure pump will cut back in again and workpiece may be ruined. Also the oil may become overheated as a large volume would be spilling thru the relief valve.

The use of a dead weight accumulator



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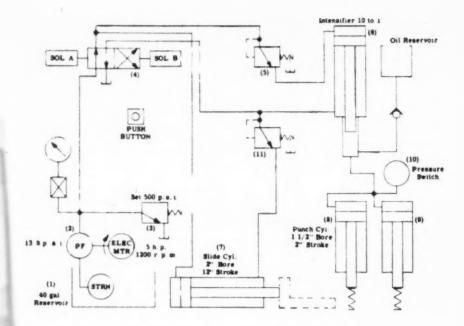
along with two or more reducing valves in a hydraulic circuit is one solution on testing fixtures. A different pressure may be set at each station by merely setting the reducing valves accordingly. The accumulator acts as a pressure storage tank to supply pressure to each branch of the circuit. The only time that the pump and motor on the power device operates is when the accumulator reaches the end of the stroke and more high pressure oil is required. Limit switches are contacted by trip dogs connected to the accumulator ram which starts the motor at the end of the down stroke and stops the motor at the end of the up stroke.

Many combinations of the above circuits can be worked out to give dual pressures depending upon the application and needs. Saving in horsepower, reduction of heat, few packing failures, and longer oil life are some of the advantages of the dual pressure system.

The following circuits are symbolmatic of some of the dual pressure hydraulic circuits.

Hydraulic Circuit No. 1 Circuit Using Intensifier To Power Punch Cylinders

- (1) Operator places work on slide cylinder table and momentarily depresses button on electric push-button station, energizing solenoid "B" of solenoid operated valve No. 4, shifting piston and allowing oil pressure to flow to blind end of slide cylinder No. 7.
- (2) After piston of slide cylinder No. 7 moves to end of outstroke, pressure builds up, opening sequence valve No. 5, and oil pressure flows to blind end of intensifier, forcing intensifier piston forward.
- (3) Intensified pressure flows from end of intensifier to single acting punch cylinders No. 8 and No. 9. At end of punch stroke, full pressure builds up, closing pressure switch No. 10.



Circuit Using Intensifier To Power Punch Cylinders

Hydraulic circuit No. 1

- (4) Closing of pressure switch No. 10 energizes solenoid "A" of valve No. 4, shifting piston, allowing oil to flow to rod end of intensifier cylinder, retracting piston and allowing springs to return pistons of punch cylinders No. 8 and No. 9 to original position.
- (5) When oil pressure builds up, sequence valve No. 11 opens, returning piston of cylinder No. 7 to original position.
- (6) Operator unloads finished pieces and reloads.

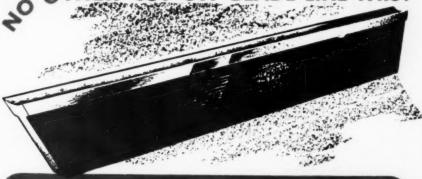
Intensifiers are used to advantage where very high force is required in a limited space. It also eliminates costly high pressure pumps.

Hydraulic Circuit No. 2

Circuit With Adjustable Hydraulic Pressure

- (1) Operator loads work under die on end of ram cylinder No. 5 and then shifts handle of four-way, two-position hydraulic valve No. 4. Oil flows to blind end of ram cylinder No. 5 at low pressure.
- (2) Operator shifts handle of fourway, three-position air valve No. 7 and air flows to blind end of airdraulic cylinder No. 8.
- (3) Piston of airdraulic cylinder No. 8 starts forward at speed set by flow control on closed hydraulic circuit. On

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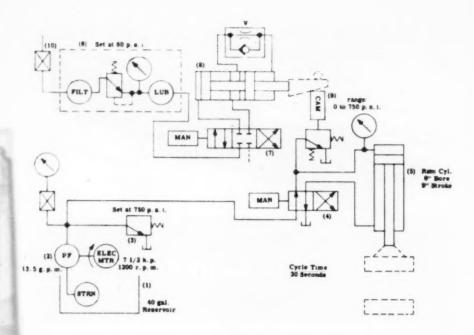
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Circuit With Adjustable Hydraulic Pressure

Hydraulic circuit No. 2

this cylinder, cam on end of piston rod contacts cam roller on hydraulic relief valve No. 9 and pressure begins to build up in hydraulic circuit.

(4) Ram of cylinder No. 5 moves forward at pressure set by cam operated relief valve No. 9. When airdraulic cylinder reaches end of stroke, full pressure is built up through valve No. 9. Operator may control this pressure by merely shifting valve No. 7 into neutral position anytime during outstroke of cylinder No. 8.

(5) Operator shifts handle of valve No. 8 and valve No. 4, causing pistons of cylinders No. 8 and No. 5 to retract.

With the minute feed of the airdrau-

lic cylinder, pressure over the entire range of the relief valve may be obtained. This is important in many applications.

Hydraulic Circuit No. 3

Dual Pressure Circuit By Use Of Two Relief Valves

(1) Operator places work on platen of press and shifts handle of four-way, two-position valve No. 4. Oil pressure at 1000 p.s.i. flows to blind end of press cylinder No. 7.

(2) Oil pressure forces piston of press cylinder No. 7 forward during pressing cycle.

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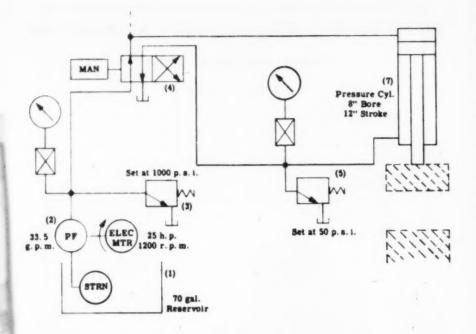
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Dual Pressure Circuit By Use Of Two Relief Valves

Hydraulic circuit No. 3

- (3) At end of pressing cycle, operator shifts handle of valve No. 4 to original position, oil, at 50 p.s.i. pressure, returns press ram to original position.
- (4) Operator unloads work and reloads. During standby period, pump pressure dumps to reservoir at 50 p.s.i.

With the above circuit, relief valve No. 5 is set so that oil pressure is just high enough to hold press ram in up position during standby period. This eliminates overheating of oil on long standby periods. In some press circuits a three-position, open-center master valve is often used but there is danger of the press ram drifting, due to internal

leakage, if die on end of ram is very heavy.

Maintenance and Service Tips Keep Air System Clean and Properly Lubricated.

It is sometimes very difficult to convince some customers of the necessity of using filters and lubricators in their air systems. They will buy several hundred dollars worth of precision air valves and air cylinders, then decide that they don't want to spend fifty or sixty dollars to provide the best preventative maintenance money can buy. Filters and lubricators should be placed at the beginning of each circuit. In long pipe runs from the compressor, much condensation and scale often form, and



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if a filter and lubricator are not placed at the beginning of each circuit, the scale and condensation will enter into the valves and cylinders. Scale is usually extremely hard and a little will score valve liners and seats and cylinder walls after a few cycles causing excessive leakage. It would be difficult to estimate the loss each year caused by dirt and scale cutting the precision surfaces of valves and cylinders.

Recently, the author was called in on an application where the customer was having trouble with clogged filters. Upon examining the filter unit, it was found that it had collected over a pound of fine pipe scale which completely filled the receiver. In checking with the customer, it was found that the filter unit had only been installed for a few weeks. Think what would happen to the valves and cylinders if it weren't for this barrier.

The above is not uncommon especially on older layouts. Condensation forming

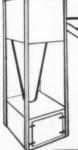
over a number of years causes scale and rust which oftentimes practically shut off the flow of air in the line.

Proper lubrication is also very important in maintaining an air system. In many instances, the sticking of pistons in control valves can be directly traced to improper lubrication. This is especially true in applications where the control valves are located close to furnaces or in other high temperature places. Without proper lubrication in air cylinders, considerable friction is created which reduces the life of the cup packings on the piston. Tests show that with proper lubrication, synthetic cup packings will operate for many million cycles without any great wear and without leakage whereas without lubrication will leak after a short run. When using leather cup packings on the piston assembly, if lubrication is not sufficient, the cups will dry out and leakage will be great especially in high heat areas.

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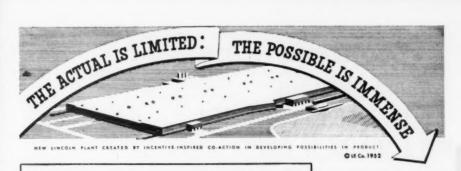
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of belt platen support Grinder. Shous assembly on Porter Cable BG-8 Inset: Rear view of of the machine. accuracy and

Fig. 3-Detail of Column

sions of the machine or without

increasing costs. On machine tools like ours, rigidity is basicaly important as it directly affects ultimate accuracy and efficient

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Fig. 1 - Former Design - Belt platen support for grinder was originally a casting. Required machining operations to finish the front face and the mounting arms.



Fig. 2 — Present Design in Welded Steel — Is simpler to fabricate than the original construction. Components are pre-machined prior to welded assembly to simplify manufacture.

HERE'S HOW

By Eric Hartmann, Experimental Research Engineer The Porter Cable Machine Co., Syracuse, New York INCREASING COST

OY changing over the design of our belt platen (Fig. 1) would deflect from .017" to .020" under 400 support to welded steel construction, we have cut deflection over 90%. The former cast construction,

pound table pressure. The present welded steel design deflects only .0015" to .002" ... 10% of its original value. Since steel is 2% times more rigid than gray iron, it was possible to develop a more efficient product design on the platen itself without changing the basic dimen-

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End of part 5. The sixth and concluding part will appear in the November issue.

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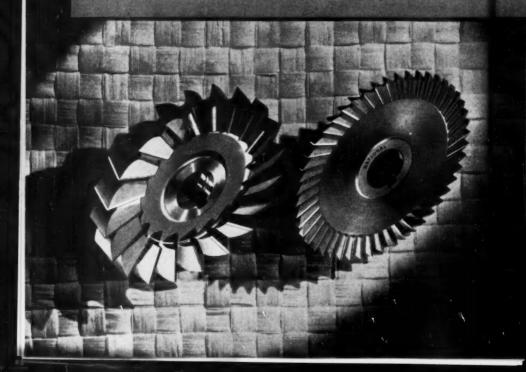
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A Company of the Comp

By William F. Schleicher, Editor

MUCH HAS been written recently about the use of box strapping and friction sawing; some people appear, at first blush, to have gained a cost advantage because a piece of box strapping is cheaper than a friction saw band. There might be some merit to using box strapping if initial cost were the only consideration and overall cost of doing the job and speed of production and versatility of sawing were no objects. Using this comparison, a man doesn't have to fly from Chicago to New York, or take a train, he could walk if cost of transportation were the only consideration and time of no importance. In an effort to get at the truth about box strapping as a substitute for a friction saw band, we contacted several manufacturers, one of which was asked to run a series of tests which form the basis of this article.

In the following cost calculations, we have used a labor cost of \$2.00 per hour

and a conservative 150% overhead, and have given no consideration to secondary operational costs as far as burr removal, grinding, etc., are concerned.

To add the tool cost to any of the following tests it is necessary to consider the relative flex life of box strapping to a friction saw band. In one test the box strapping broke after flexing two hours and forty minutes. The friction saw band broke after flexing six hours and forty minutes. On the basis of these tests, the box strap type band purchased at a cost of 10c per band, and a friction saw band bought at a cost of \$3.00 per band, the relative tool cost for an eight hour shift would be 30c for the box strap type bands and \$3.72 for the friction saw bands. However, the tool cost is relatively unimportant in these tests as will be shown, as there will still be a daily saving by using the friction saw band over box strap type band.

Research Procedure

The tests were conducted on a friction sawing machine with specially constructed ball bearing cut-off feeding device equipped with weights suspended from a cable riding over a pulley attached to the back of the standard feed table. The material was placed in front of a cut-off bar feed to move in a lateral direction while cutting in order to determine the tendency of the band to lead. All cuts were made using a velocity of 9,000 feet per minute. The

standard table was provisioned so that the burr created would not hang up on the back of the saw slot opening. After each cut the burr was removed from the remaining stock to enable checking squareness and straightness of cut.

Purpose of Test

To determine the relative friction cutting efficiency between 3/4" wide .035" gage plain steel box strap type band and 3/4"-10 pitch, .032" gage, .055" set friction saw band.

Test No. 1

Material	Stainless	Steel (No	. 304)
Material thickness		. 1/8"	
Length of cut		. 5"	
Number of cuts/band		. 10	
Feeding pressure		. 10 lbs.	

Cutting Results: Linear inches cut/min. Linear inches cut/hour Size of burr (bottom) Size of burr (top) Depth of heat penetration	8.50 510.00 .093" .028" Excessive	Friction Saw Band 32.70 1.962.00 .031" None Slight
Cost to cut 15.696 linear inches (8 hrs. x 1962.00 linear inches at \$5.00/hr.)	\$153.85	\$40.00

(Operator's labor figured at \$2.00 per hour plus a conservative 150% overhead cost or a total of \$5.00 per hour.)

After 10/cuts the feeding pressure was increased to 15 lbs. and using the same technique, 10 additional cuts were made with the following results:

Number of cuts/band Linear inches cut/min. Linear inches cut/hour Size of burr (bottom) Size of burr (top) Depth of heat penetration Cost to cut 25,776 linear	Box Strap Band 10 20.20 1,212.00 .093" .028" Excessive	Friction Saw Band 10 53.70 3,222.00 .031'' None Slight	
inches (8 hrs. x 3,222.00 linear inches at \$5.00/hr.)	\$106.30	\$40.00	

(Operator's labor figured at \$2.00 per hour plus a conservative 150% overhead cost or a total of \$5.00 per hour.)

Remarks:

Size of burn produced by a band is approximately the same at 10 or at 15 pounds feeding pressure but actual amount of burn is much less when using the friction saw. At 10 lbs. feeding pressure the friction saw produced no lead, while the box strap type band lead was as much as .125". At 5 lbs. feeding pressure, the friction saw left lead on only one cut was .060", while the box strap type band right lead on six cuts was .125".

Test No. 2

Material Armor	Plate	
Material thickness	/16"	
Length of cuts	5"	
Number of cuts per band	16	
Feeding pressure	191/2	lbs.

Cutting Results:	Box Strap Band	Friction Saw Band
Linear inches cut/min. Linear inches cut/hour Size of burr (bottom) Size of burr (top) Depth of heat penetration Cost to cut 8592 linear inches (8 hours x 1074.00 linear inches) figured at \$2.00 per hour operator's labor plus a conservative 150% overhead cost or a total of \$5.00 per	1.90 114.00 .156" .046" Excessive	17.90 1,074.00 .062" None Shallow
hour, but not including band tool cost	\$376.85	\$40.00

Remarks:

Both bands produced approximately the same amount of lead which was zero to .093" right or left. The box strap type band broke after the first cut of the second series of 16 cuts, while the friction saw band was still cutting efficiently after making a total of 32 cuts.

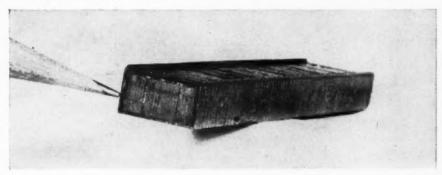
Cutting Action

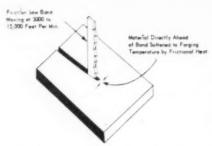
The box strap type band without teeth utilizes a rubbing action to develop heat the same as the friction saw band, but instead of cutting away the softened metal like the friction saw, it pushes and wipes approximately 80% of the softened material from the kerf where it fuses on the underside of the cut forming a large burr. As the pushing and wiping action takes place a

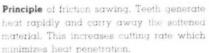
certain percent also pushes upward, resulting in a top burr. The box strap type band pushes its way through the material at a slower cutting rate; therefore, the thermal penetration into the side walls of the finished cut is much greater.

Excessive thermal penetration is undesirable because on materials such as

Armor plate cut with a friction saw band. Note smallness of burr and complete absence of burr on one side of cut. Pencil indicates extent of heat penetration, in this case virtually non-existent.







stainless, the non-corrosive characteristics are destroyed. In the case of manual feeding, the friction saw has a great advantage in minimizing operator fatigue, because considerably less feed pressure is required.

Principles of friction sawing

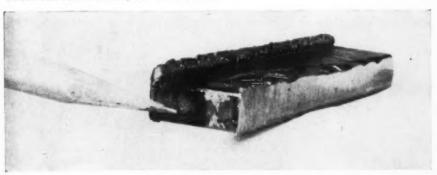
Friction sawing utilizes the frictional neat generated between the saw band teeth and the material when the band is moving at very high speeds in the range of 3,000 to 15,000 feet per minute. Consequently, if the speed can be made



Enlarged photograph showing type of chip produced by friction sawing. A sharply curled chip, the result of a hard shearing action, is produced by conventional sawing; a shorter stubby chip with less curl and pronounced cracks and wrinkles is produced by friction sawing where the material is cut in a softened state.

high enough, and maintained there, it is theoretically possible to cut with a paper band, or with wire, or with any other material. The frictional heat

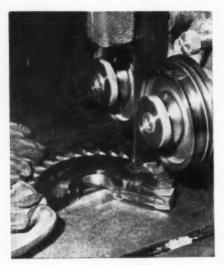
Piece of armor plate friction cut with box strap. Note large burn. Pencil indicates extent of heat penetration which is excessive because toothless band needs more heat to cut and because slower cutting rate gives heat a chance to penetrate. Abnormal heat penetration can ruin metalluraical characteristics.



For the FINEST Tools...



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raises the temperature of the material directly ahead of the band to approximately its forging temperature at which point it is soft and relatively plastic. Splitting a milling cutter. The friction saw band can cut materials harder than the band itself.

Naturally, the teeth bite more easily into the softened material virtually scooping the material from the kerf. You can see that tooth sharpness is not a prime factor in cutting rate. The teeth are important in generating heat, in removing material, in reducing the amount of feed pressure required, and last but not least, in reducing burr to a minimum.

In connection with the fast cutting facilitated by the teeth of the friction saw, it is interesting to note that fast cutting is a requisite for effective friction sawing. Too slow a cutting rate allows the heat to penetrate more deeply through the material, ofttimes destroying the desirable metallurigical characteristics of the metal. For ex-

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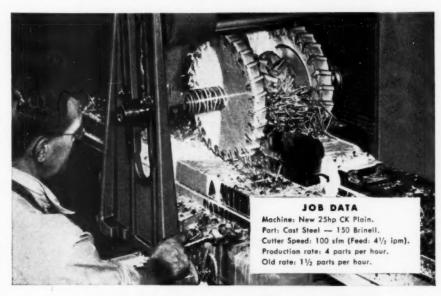
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ample, undue penetration of heat can burn the metal or ruin its temper, or in the case of such alloys as stainless steel, ruin its corrosion-resisting properties. Where cutting is rapid the point of intense heat moves along so quickly that there is not time for heat penetration to occur. Selection of the proper saw band and operating factors such as speeds and feed pressures can assure this rapid cutting and the minimizing of heat damage to the material.

Friction sawing is not ordinarily recommended for non-ferrous metals because these are free-machining materials that are readily cut in the conventional manner. Also, a better cut finish is usually obtained with conventional sawing so that it is more expedient to use this method on free-machining materials and achieve both good cutting rate and finish at the same time. Again, because of the comparatively low melting points of non-ferrous

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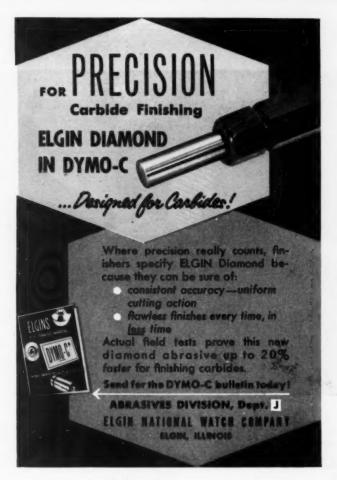
DIVISION NILES-BEMENT-POND COMPANY
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metals, there is a tendency for the softened metal to weld to the walls of the kerf, further reducing the quality of cut finish and increasing the amount of clean-up machining required. However, under certain circumstances and for certain non-ferrous alloys, friction sawing is sometimes recommended.

Conclusion

New ideas wich challenge the old are not unusual; many do not live long enough to displace the established methods, some remove the old and reign supreme until they in turn are replaced. However, no new method can replace any other unless the new is better in overall performance and, in addition, contributes either cost-wise or production-wise to more economical manufacturing.

When comparing a new tool (in this case, box strapping), with an established tool (friction saw bands), speci-

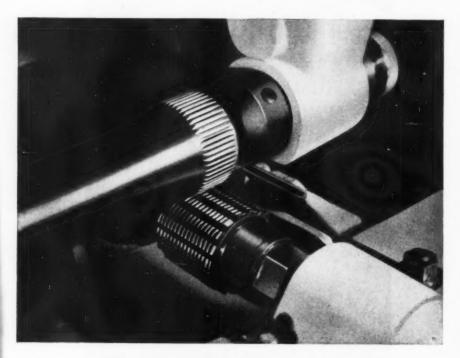


fic answers must be established for the following points before the tool can be evaluated correctly, or before the new can usurp the old: (1) Initial cost of tool; (2) cost of tools to complete a production run; (3) cost of secondary operations, if any; (4) production per tool/per worker; (5) cost-of-tool/production/cost-of-manufacturing ratio; (6) effect on workpiece, i.e., finish, metallurgical changes, etc.; (7) operators' safety and fatigue; (8) tool versatility, that is, its ability to be used in different operations, for instance, the

friction saw band because of its set teeth, cuts radii (shapes) as easily as it makes straight cuts.

On the basis of tests which we have personnally witnessed, two of which are reported here, we have come to some definite conclusions regarding the use of box strapping as a cutting tool. Manufacturers desiring to use box strapping would be wise to make their own cost and production investigations before undertaking what might develop into extremely costly and time-consuming manufacturing operations.

The End



Barber-Colman HOBBING DOUBLES TOOL LIFE - CUTS PRODUCTION TIME

HARD STEEL TORSION BARS, 45-50 R. C.

Hobbing tough, hard materials — such as this torsion bar job — presents no special production problems when you use the Engineered Hobbing approach.

These torsion bars, 45-50 Rockwell "C", approach the upper limit of machineability for

hobbing. Structure and toughness of the material caused hob teeth to wear rapidly.

Barber-Colman Hobbing Engineers worked closely with production officials in this plant to produce the desired results on this job. Substantial tool savings, increased tool life, and better production time resulted. Total hob life has increased from approximately 600 to over 1200 ends.

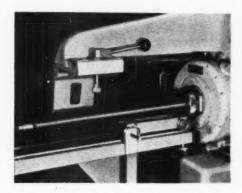
TOOL COSTS REDUCED WITH CLASS C ACCURATE UNGROUND HOBS

Barber-Colman engineers recommended 4-thread Class C Accurate Unground Hobs and automatic hob shifting to increase tool life and production in this hard material. Results showed an average increase from 65 to 120 hobbed ends per hob sharpening. The use of unground hobs has reduced tool cost considerably. Cutting time is 5 minutes per end, the length of cut being 11/8".

The form on the hob is a 48° 44' pressure angle serration with a full radius at the top of the tooth. The hob is non-topping. Climb hobbing allows the hob tooth to start its cut in metal which has had no opportunity to be work hardened.



COMBINED ENGINEERING OF HOBS, TOOLING AND MACHINES PRODUCES BENEFITS



Results obtained on this hobbing job show the benefits possible when hobs, machines and tooling are combined through proper engineering to meet the specific problems of the job.

New No. 16-16 Hobbing Machines are used, equipped with 30" rear overhanging center bracket. Bars are loaded from the rear of the spindle, where the operator easily pushes them from a conveyor into the spindle. A special steadyrest bracket guides the bar and protects the hob while loading. Work change time is 1½ minutes.

You, too, can simplify your hobbing problems by consulting Barber-Colman engineers. Why not contact them today for an evaluation of your hobbing methods.

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HOBBING MACHINES
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HOBS AND MACHINES SINCE 1911

Reduce wheel and grinding costs with atomized spray grinding coolant

by H. I. Chamberland Research Engineer The DoAll Company Des Plaines, III

GROUND SURFACES of micro inch accuracy without disregarding the time element, are the result of a combination of factors such as: 1. rigidity to less than .0001" between wheel and work: 2. constant film of oil between the ways to prevent settling, plus a constant film of oil as a cleaning agent; 3. hydraulic drive or "liquid" power

for smoothness of operation; 4, separation of automatic and manual crossfeeds for maximum accuracy 5. finger-tip controls for simplified operation; 6. last but not least, a dependable coolant system but preferably one providing foolproof results, s as the atomized spray. Although single one of above first five coo tive features, if inefficient Nore About disrupt all others, the



Surface finishes of from 7 to 10 micre inches RMS with a .005" down feed, .010" cross feed and 36 to 55 fpm table feed are now production facts in many plants.

THERE IS a dependable test to determine whether or not a surface grinder of the horizontal spindle-traverse table type has the essentials to meet existing manufacturing standards, meaning the delivery of fine precision on a satisfactory production basis. Briefly, the procedure is as follows: (1) As a specimen, select a piece of hardened general purpose tool steel 3/4" x 2" x 6"; (2) dress a 10" x 3/4" wheel of proper selection; (3) take a .002" or .003" cut and position dial indicator set at zero on the work surface; (4) set hand wheel for .0135" stock removal (.0125 or .0145" will do as well) and grind with a .010" cross feed and ample flow of conventional coolant: (5) check results and if the indicator shows exactly a .0135" drop or whatever the setting happens to be, this efficiency is considered far above the average.

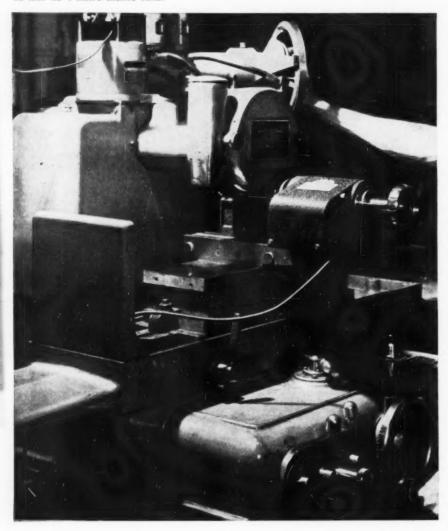
It is doubtful if 60% of all surface grinders of this type now in operation can duplicate such performance. Above all, there is a substantial percentage of machines meeting this test that cannot maintain this accuracy to a corresponding degree based on thinner material thicknesses, increasing surface areas and particularly so on the tougher steel alloys. One thing is definitely true, most designing and production engineers seem to agree that extremely fine surface finishes with relatively accurate flatness and parallelism, with heavy down and cross feeds, are not necessarily 100% the outcome of some speci-

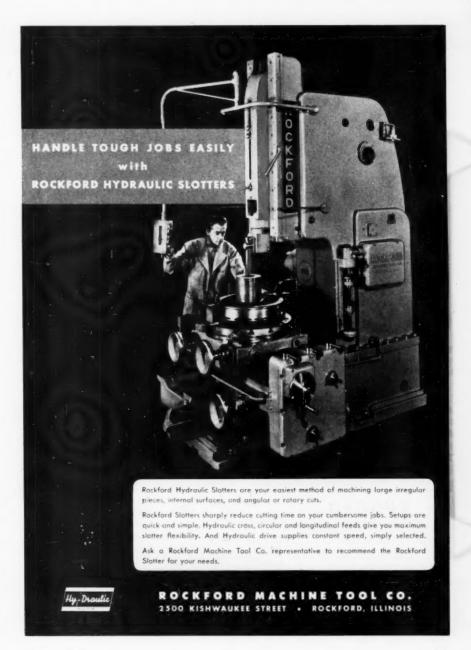
Ed. Note: The June, 1951, issue of the MACHINE and TOOL BLUE BOOK carried an article on "Cool Grinding." The principles and techniques, as well as equipment necessary for successful cool grinding procedures, were outlined. In this month's follow-up article a few case histories are presented, based on operations which have come to light in the last year.

fic or a combination of constructive features. As a matter of fact, the results are dependent to a major extent on the prevention of any sudden rise in temperature and subsequent shock quench responsible for so many costly surface cracks and numerous skin softness and warpage defects.

Insofar as heat control measures affecting precision surface grinding prac-

1. Atomized spray coolant used in connection with cylindrical grinding attachment provide most economical means to finish die, jig and fixture components to a precision as fine as 4 micro inches RMS.









3. This die previously required an average of four .002" down feed cuts to resharpen, it is now reconditioned by taking a .005" roughing cut and a .001" finishing at double the former cross feed but most significant is the fact that the die now produces 800 more blanks between grinds.

2. Electronic control over amount of magnetic force has by itself solved the problem to surface grind thin or sheet metal sections. However, the new method of coolant application has in many cases increased production threefold.

tice is concerned, hundreds of widely scattered tool and die shops are benefiting immensely from the atomized spray system whereby the coolant is forced through the pores of the grinding wheel. The functions of this development were described in the June issue of this publication. An innovation then, this

method of controlling heat exactly at the point of cut has since brought forth outstanding facts and figures showing increased production with wheel life reaching a new high and defective work a new low.

It is hoped that accompanying case histories will prove beneficial to many

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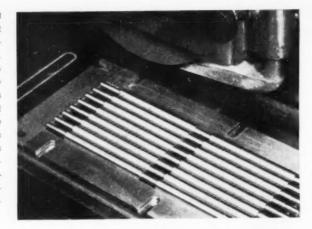
Yours very truly,

CONTINENTAL MACHINE COMPANY

John B. Barten, Partner

Morgren.

3438 S. ELATI ST., ENGLEWOOD, IN COLORFUL COLORADO 4. Atomized spray is not limited to tool work but obviously applies to production grinding as well. Note cleanliness of set-up with special coolant fixture valves set for 250 drops per minute to arind a flat the entire length of the shafts in a single cut. As also shown this arinder is also equipped with the conventional recirculating system since both often simultaneously prove very effective.



keymen and grinder operators experiencing too much downtime and unnecessarily too high grinding costs. It will be observed that the grinding techniques vary according to requirements, as for example: in some cases the volume of "cool grinding" concentrate must be increased substantially with the conventional flow also used to good advantage. The degree of micro inch finish is of course governed by the amount of down feed, cross feed and



table feed; these factors in turn obvi- precision or volume, or an efficient ously affect flatness and parallelism compromise, or blend, the problem can accordingly. Whether the objective is definitely be conquered.

CASE A

Material Data

"Crocar" Steel

Analysis: C 2.20, Si .30, Mn .20, Cr 12.O, V .40, Co. 50, Mo .80

Size: 42"x234"x1834"

Requirements

General efficiency-production predominating.

Grinding Recommendations

Wheel Diameter 10" 3/4" Wheel Thickness

Wheel Type Aluminum Oxide

Grain Size 60 Grade 3 Structure 9 V Bond

Table Speed 20 feet per minute Cross Feed .010"

.005" and .010" Down Feed Coolant From 200 to 300 Drops/Min.

Results

Surface Finish (RMS) 14 .0002" Flatness

.0001" to .0002" Parallelism

CASE B

Material Data

Ketos (oil hardened) Size: 11/4"x5"x31/2"

Requirements

General efficiency—flatness and parallelism predominating.

Grinding Recommendations

Wheel Diameter 10" 3/4" Wheel Thickness

Wheel Type Aluminum Oxide 60

Grain Size Grade 3 Structure 9 Bond

Table Speed 36 feet per minute

Cross Feed .020" .002" Down Feed

175 Drops/Min. Coolant

Results

Surface Finish (RMS) 7.5 .0001" Flatness Parallelism .0001"

CASE C

Material Data

High Speed Steel (No. 1841) Broach Hardness 64-66 "Rockwell C Size: 21/4" wide by 5%" thickness

Requirements

General efficiency by crush grinding

Grinding Recommendations

Wheel Diameter 10 inch Wheel Thickness 2½ inch Wheel Type AA Aluminum Oxide Grain Size Grade Structure Bond V-10 Table Speed 55 feet per minute

Cross Feed None .0005" to .001" per table pass Down Feed Coolant Atomized spray and flush type 11 Minutes 15 Seconds Grinding Time

CASE D

Material Data

Silvanite "Air Die" Steel Steel Composition: Carbon 1.3%, Tungsten 8%, Chromium 4%, Vanadium .25% Size: .089"x.745"x2.05"

Requirements

Production and wheel life predominating.

Grinding Recommendations Wheel Diameter 10 inch Wheel Thickness 3/4 inch Wheel Type Aluminum Oxide Grain Size 60 Grade Structure Bond V-20 Table Speed 25 feet per minute Cross Feed .050 inch

.0235" 1st edge - .027" 1st side Down Feed Operation No. 1 .0235" 2nd edge - .027" 2nd side Operation No. 2 Coolant 200 to 300 drops per minute

Results

Surface Finish (RMS) Flatness .0001 inch Parallelism .0001 inch 9.78 minutes or better Grinding Time

(67 pieces)

CASE E

Material Data

Titanium, 150 A Alloy

Composition: Carbon 0.25, Chromium 2.70, Iron 1.30, Nitrogen 0.25, Oxygen 0.02, Titanium-balance

Size: 3.325"x1.340" thick.

Requirements

General efficiency

Grinding Recommendations

Wheel Diameter Wheel Thickness Wheel Type Table Speed Cross Feed

Cross Feed Down Feed Coolant

Results

Surface Finish (RMS) Flatness Parallelism Grinding Time 10 inch 34 inch DoAll General Purpose 55 feet per minute From .005 to .007 inch .0005 Finish to .015 Rough 200 to 300 drops per minute

5 to 10 RMS .0001 inch .0002 inch 20 minutes

The End



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VISIT THE STARRETT EXHIBIT — BOOTH 1843 — National Metal Congress — Philadelphia, October 20-24

Training the blind to run engine lathes

by L. T. Bruhnke

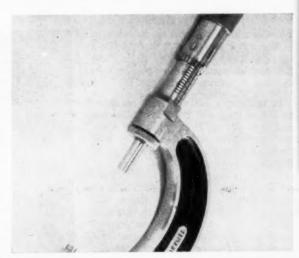
MACHINE shop work is usually thought of as requiring reasonably good eyesight. Substituting feel for watching the cutting tools or trying to grind tools seems dangerous. In spite of its seeming impossibility, Arthur Beijer, of the Milwaukee Vocational School, is training 15 blind men to run engine lathes.

Those without experience in employing the blind are apt to say, "But my plant is different. I can't use blind workers." Actually, any new worker, with or without sight, needs orientation. A blind worker who has never worked in industry may need a little more attention at the start, but as a rule the blind are not distracted by as many things as sighted workers. This greater concentration offsets their handicap. Personnel men say that the presence of blind workers makes the others more conscious of the need to protect their eyesight. Beijer knows that a blind worker who can perform all of the operations on an engine lathe can be used to advantage on a great many produc-

On the thimble of the Beijer micrometer, 0 has a dot; .005 has a bar; .010 has a bar and dot; .015 has a dot bar and dot; .020 has a dot and a full length bar. Graduations are deep enough so they can be felt by the blind.

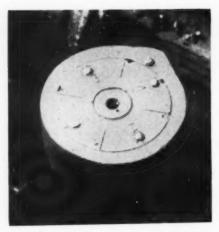
The barrel has three lines of graduations. In the line where the .025 markings usually are, the Beijer mike has .1, .2, .3 and so on. The .050 graduations are in another line toward the frame. The .025 and the .075 graduations are in another line away from the frame.

Thus the blind count the tenths along the center line of graduations. Then they determine whether it is near the .025, the .050 or the .075 lines by feeling



in the two rows. The thimble reading is obtained with the bar and dot

markings. They can feel the graduation between the dot markings.



The dots brazed on the thread dial Indicator are used to engage the clutch at the right time when cutting threads. While they look pretty much alike, the No. 1 dot is a little flatter than the rest so the blind can tell which is which.

tion jobs. Orientation of the recently blinded is more difficult than for those who were born blind.

Beijer's blind trainees are first taught to file a flat surface and then to file a block to a right angle. This gives them the feel of metal and helps them in the use of instruments.

In starting a trainee on a machine, he is first taught all the parts before the motor is started. He manipulates all of the controls he will need on the preliminary exercises. He is taught all of the danger areas and the places he must not touch when the lathe is running. All of the parts-live center, dead center, face plate, four jaw chuck, tool post, compound rest, tail stock, carriage, hand wheels, and so on, are pointed out before the machine is started. All controls are moved so the man knows what happens when it is moved. He is taught that it is less dangerous to reach in from below than from the top.

All of the machines are standard, except for the Braille markings on the thread dial indicator. The dots used for marking were brazed on. An indicator is also provided for the handwheel so the trainee knows the position of the carriage without feeling for the cutting tool. All trainees can feel the sixteenths markings of the standard steel scale and some are able to feel of the sixty-fourths. They are also able to feel the graduations on the ordinary protractors. For more accurate measurements, they use a special blind micrometer designed by Beijer.

At first, trainees are given simple turning to size problems. As they gain in skill, the work becomes more complicated. In all chuck work, they use a four jaw chuck. Lining up work with a four jaw chuck is good practice for

The index point is screwed to the machine.

The clamp on the handwheel is lifted off and shifted to whatever position the operator requires.



190

the trainees. At first the tools are ground for them. Later they are taught tool grinding, in case their employment requires it later. The blind can feel the position of the wheel by the air currents. When first contacting the wheel, they hold their tool lightly. After making contact, they hold it firmly.

When threading, they determine the length of thread needed and position the tool for the length desired. Then they clamp an indicator on the handwheel at the index point. Braille markings on the thread dial indicator tell them when to engage the feed, and the handwheel indicator tells them when to withdraw the tool. Before finishing the course, the men learn all engine lathe operations: drilling, tapping, single, double, triple thread cutting, boring internal threads and tool grinding.

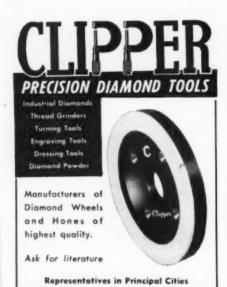
A Bardons and Oliver turret lathe is used to learn production techniques.

Recently, when cutting some 2-56 threads with a solid die on a production job, a new die was needed but the one available did not fit the holder. The blind trainee merely stopped his production job and made the proper sized holder on an engine lathe and then went back to his turret job. On this job, it was necessary not only to reverse at the proper time but also withdraw the carriage by hand without stripping the thread.

Some of the trainees have been blind since birth, while others have been recently blinded. A recently blinded bus driver signed up for the course to prove it could not be done. He has since changed his mind and is now enthusiastic.

One of the trainees, of Indian descent, had to give up his job of teaching music in the public schools because of the difficulty with discipline. Another blind trainee only has six fingers. Another of them is a piano tuner.





In giving instructions for what is wanted, Beijer types them in Braille on a sheet of clear plastic. Paper could be used, but the dots disappear when fingered with greasy fingers. He gives the overall length and the various lengths and diameters needed. It is also possible to give a sample of the piece wanted to the trainee and he can make the various measurements.

Time needed for jobs compares favorably with other trainees. Recently Beijer wanted some milling done and it was necessary to use a machine in another room. The blind man had never been on a milling machine before and Beijer gave him enough work for all afternoon. In a little while he came back for more work.

The blind do not want charity. Their concentration offsets their handicap. The accident record of the blind has been good and the presence of blind workers makes others realize how priceless sight is.

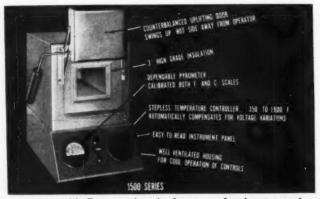
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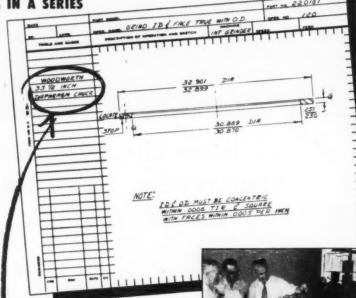


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SELECTING THE MOST EFFICIENT

ABRASIVE CUTTING-OFF WHEEL

LABOR IS not the only factor which should be taken into consideration when figuring cost of abrasive cutting. The other factor which should be given equal attention is the abrasive cost. Therefore, to select the most efficient abrasive cutting-off wheel, consideration must be given to the total costs involved., i.e., labor, overhead, and abrasive cost.

Due to the accuracy, speed of cut and degree of finish obtained with abrasive cutting-off wheels over other methods of cutting on most metallic and non-metallic materials, abrasive wheels as a production or machine tool are playing a more important part daily in modern industry.

The abrasive wheel method of cutting is particularly adaptable for general purpose cutting-off in the tool room in salvaging tools, cutting tubing, angle iron and bar stock. Other major uses are for high production cutting of steel tubing, alnico magnets, pen nibs, soil pipe, brick, fiber board, transite and brake lining. Still other uses for abrasive cutting-off wheels are in foundries



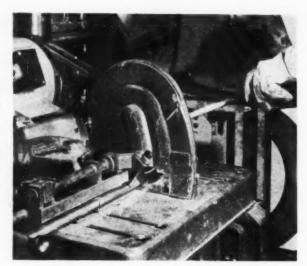
by Harold F. Tucker Abrasive Engineer, Simonds Abrasive Co., Philadelphia, Pa.

for cutting the gates and risers from various types of castings, and in production shops for slotting or grinding grooves in various materials.

The use of abrasive cutting-off wheels is limited by the size of the material which can be cut efficiently with abrasive wheels; however, special machines have been developed to handle stock up to 6" diameter.

Of the three methods of abrasive cutting—dry, wet, and submerged, dry cutting is by far the fastest method and most efficient where a slight discoloration or burring of the work is not objectionable. Depending upon the design

Cutting a bar on a regular cut-off machine. Abrasive wheels can cut even the most difficult materials in a matter of seconds; further, they permit cutting to length within close tolerance dimensions.



of the machines, these wheels usually operate between 9,000 and 16,000 surface feet per minute. Wet cutting is used where only a very slight or no discoloration or burr is permissible. With this method, the wheels generally run between 8,000 and 10,000 surface feet per minute. The submerged method of cutting is employed for cutting heat sensitive materials such as glass, plastics and metallographic specimens with wheel speeds between 4,000 and 7,000 surface feet per minute.

Too frequently, the selection of abrasive cutting-off wheels is based upon a "good cutting time." Or, as one foreman recently put it, "Labor cost is at a premium at this plant. Everyone is labor cost conscious. We want a fast cutting wheel." His idea was that the faster the wheel cut, the less would be the labor cost per cut; and since labor was so high, he was keeping costs down in his department by using a "fast cutting wheel." Actually, the costs were higher than they should have been because in addition to the labor cost, he should have taken into account the abrasive cost, or total costs.

Actual tests at this plant between the standard "fast cutting wheel" and those of slightly harder grades revealed the following information:

Wheel	Standard A	Trial	Trial
No. Cuts/Wheel	21	30	36
Total Contact Time, Min.	17.08	28.24	39.62
Average Time/Cut, Min	0.81	0.94	1.10
Labor & Overhead Cost/Hour (Assumed)	4.00	4.00	4.00
Net Cost/Wheel	3.54	3.54	3.54
Labor & Overhead Cost/Cut		.063	.073
Wheel Cost/Cut	.169	.118	.098
Total Cost/Cut	\$.223	\$.181	\$.171

Free-handed cutting is easily accomplished on small pieces without the use of special fixtures. There is almost no limit to the types of materials which can be cut with an abrasive wheel.



At another plant where "time per cut" was the sole basis of wheel selection, the following results were obtained:

S	tandard	Trial
Wheel	D	E
No. Cuts/Wheel	15	15
Total Contact Time, Min.		14.43
Average Time/Cut, Min,	0.82	0.96
Labor & Overhead Cost/Hour (Assumed)	4.00	4.00
Net Cost/Wheel	3.54	3.54
No. Cu. In. Wheel Usable	8.6	8.6
Cu. In. Wheel Used (15 Cuts)	7.8	6.1
Cost/Cu. In. Wheel (Usable)	0.412	0.412
Labor & Overhead Cost/Cut	.055	.064
Wheel Cost/Cut	.214	.167
Total Cost/Cut	\$.269	\$.231



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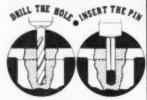


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3 Graves FALL LINGTH of Pin





TYPE "B"





In both of the above samples, the savings in abrasive cost with the trial wheels more than offset the increased labor cost over the standard "fast cutting wheels." These results indicate why it is necessary to figure total costs when selecting the most efficient abrasive cutting-off wheel.

The End



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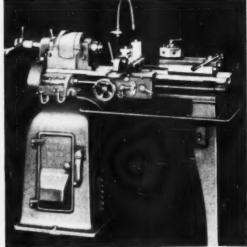
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Getting along with people

by Edmund Mottershead,

Mottershead Associates

Some foremen distrust any foreman training, feeling it often advocates a "soft" policy toward workers.

It is certainly not wise to be tolerant of mistakes and poor work attitudes. The question remains: how do you go about "straightening out" an erring employee? Here is where the foreman needs some sort of intelligent method—whether he develops it himself or with the help of some form of foreman "training."

structions to tell him in great detail what the doctors have told his wife at the maternity hospital, Jim blows his top and tells Sam off.

"Sam," he scowls, "you talk like three old ladies over the back fence. While I'm talking save the guff about your old lady for someone who wants to listen Act like a grown man. This is a shop, not a tea club. Now listen to me for a

"Blabbermouth Sam"

SAM IS A FELLOW ABOUT 27 years old, has been working in the machine shop for almost two years, and shown that he catches on fast.

Sam's foreman, a veteran named Jim, is finding out that Sam has a real weakness which tends to slow him and the whole department down. Sam talks too much. He has the habit of flapping his jaw about everything under the sun when Jim is trying to tell him how to do a particular job.

Jim is getting a little fed up, and one day, when Sam interrupts his in-



"Yakkety, yakkety....

change and let's get a little work done around here."

We all agree that Sam did talk too much and that something had to be done about it. However, there are several things wrong with the method Jim used to "straighten him out."

He bawled Sam out in front of the other workers and gave him no fair chance to "defend" himself. In his anger, Jim overdid it by implying that Sam was deliberately "goofing off" and by ridiculing him as "an old lady." The total effect of Jim's outburst was more to make Sam resentful than cooperative. Jim maintained his "prestige" as foreman, all right, but he certainly did not do a really effective job of "correcting" Sam.

There are a couple of very simple things the foreman can do to handle the talkative worker. He must take the driver's seat from the start and not



"Shuddup, blabbermouth!"

give it up for a second. He should make it clear at the outset of any conversation that his sole interest is in getting a job

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done. Any bull session will have to wait until lunch time or after work.

When the talker seems to be taking the conversation away from the point of immediate interest, the foreman should shut him off quickly and politely, and return the talk to the business at hand. This can be done by pointing out some aspect of the problem that has not already been mentioned—"Oh yes, before I forget to tell you—so and so—."

Once in a while, the Sam type will say something that will help his foreman make it easier to deal with him. He often will talk himself into doing exactly what the foreman wants done if his attention can be confined to the problem at hand. Then, the problem may very well be to get away fast without leaving any disgruntled feeling that a fast brush-off has been effected.

If Jim had used this sort of approach with Sam, the result would have been that Sam would have stopped talking, started right in on the job and liked and respected Jim thoroughly as a top notch supervisor and a "good guy." There would have been no resentments or injured feelings, and Jim's prestige wouldn't have suffered a bit.

The self-important type

Another type of worker that foremen often misunderstand is the self-important type. This is the fellow who is just a little too good (he thinks) to associate with common people like yourself and the rest of the crew. He is sometimes patronizing in his manner, letting you feel he is really breaking his back to do you a favor when he comes to work on time or does a normal day's work. At other times, he puts on a "big deal" act, tries to show that he knows all there is to know and that you can't tell him anything new.

Such a fellow was Vic, a veteran metalworker. Vic was loud, he was conceited and he was extremely annoying to almost everyone about him.



"One side, boy!"

His fellow workers didn't care too much for him, but he usually kept quiet when the foreman was around and thus got along pretty well with him. One day, however, the foreman, Bill, came around with some complicated instructions about a job. Vic disagreed, politely but obstinately, with the proposed new methods, saying that he'd been around



"Here, what do you think of this?"

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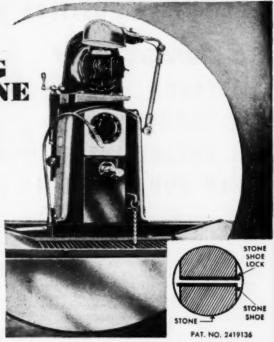
long enough to know it wouldn't work. Tempers were lost and Vic worked himself into a violent denunciation of the shop in general and Bill's foremanship in particular. Vic had to be dropped.

In the first place, Bill made the error of taking what Vic had to say at face value. What he didn't realize, because he didn't really reason the thing out, was that Vic was really unsure of himself underneath all his bluster. If he

weren't, he wouldn't have spent all his time trying to convince himself and everyone else that he was such a hot shot. Possibly he felt he wasn't receiving the proper recognition from his fellow workers and from his supervisor. Whatever the particular cause in his case, the fact remains that the self-important type is always suffering from an inferiority complex of some sort.

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Like it or not, the foreman has to cater subtly to "Mr. Big's" ego to a certain extent at the outset of his attempt to "correct" him. If the worker gets his feeling of importance from identifying himself with "important" people or recognized groups or attitudes, you can show him that you respect those same people yourself and expect him to act as they do. If he gets his satisfaction from pointing out the flaws in others, recognize that other people

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are prone to make mistakes but that he. being superior, can be counted on to do the job right the first time and every time. If he wants to do things his way rather than your way, try explaining what is to be done, getting his reaction. Ask him how he would do it. Tell him he has a good idea, if it is, and that you will expect to see good results. Let him think what you want is his own idea.

If you do this sort of thing consis-

tently for a while, you will begin to notice a change in the self-important worker's attitude. He will come to rely less and less on ego-satisfaction, and he will eventually be as "good" a guy as he was formerly obnoxious. He will do his job with enthusiasm, and will respect you as a wise, understanding supervisor.

There are, of course, many other types of "problem" workers the typical fore-

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2851 Columbus Minneapolis, Minnesota man must face all the time. And there are as many methods for solving them as there are individuals to be handled. But there is one general rule all foremen would do well to keep in mind. You can't afford to be tolerant of mistakes but you have to be tolerant of people. That is, you have to be tolerant of them long enough to understand why they are a problem and to devise means of solving that problem.

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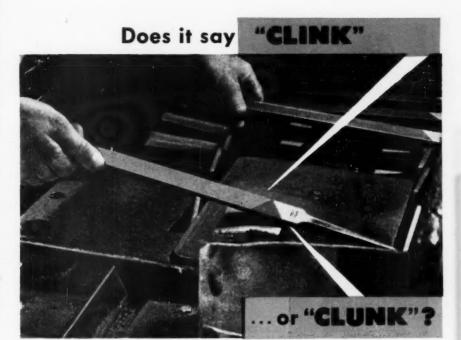
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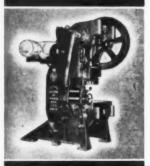


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October, 1952



#700 B GEAR PRESS



650-B PLAIN FLY WHEEL



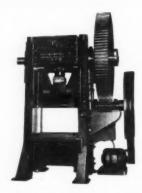
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For the many manufacturers interested in the benefits of power feed drilling, we list below some of the features to look for. These features, which include freedom from trouble first and foremost, are built into the power feed designed by "Buffalo" as an extra in No. 16 Drills:

- Simple control—feed engaged by feed motion of handle; raise handle to disengage.
- Positive gear and clutch type feed—no adjustments, no attention required other than occasional oiling.
- Both depth dial and depth control on front of machine.



Right, showing compact power feed unit available on "Buffalo" No. 16 Drills.

Left, 3-spindle "Buffalo" No. 16 Pedestal Drill, a rugged, accurate, easy handling machine for drilling up to ½" holes. Speed range is from 400 to 3000 rpm. Sensitive or power feed. WRITE FOR BULLETIN 2730-F.





SUFFALO" FOR GE COMP

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DRILLING

PUNCHING

CUTTING

SHEARING

BENDING

Materials handling plan speeds production at Cleveland plant

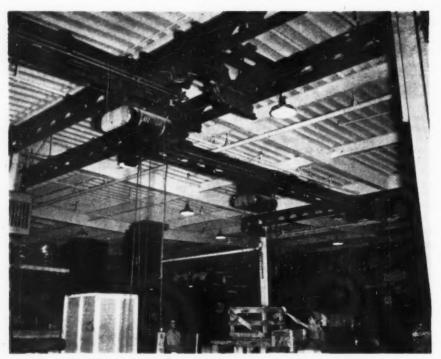
SMOOTH FLOWING PRODUCTION of electronic controls for motors and motor drives, as with so many other unit-type industrial products designed and developed for a multitude of applications, leans heavily on coordinated materials-handling equipment and techniques to provide required parts and sub-assemblies in the right quantities at the right place and time for speed, efficiency and less fatigue.

The plant recently completed by Reliance in Euclid, Ohio, is a good example by **Robert S. Smith,**Reliance Electric & Eng. Co.,
Cleveland, Ohio

Receiving dock of plant has outer and inner doors to maintain slightly elevated plant pressure and to provide seal against introduction of unwanted dirt. Office at right gives supervisory staff firsthand observation and control of two receiving docks. Office is equipped with pneumatic tube system for rapid handling of paper work with other plant departments.

Hydraulically-operated elevating platform at each dock makes fast work of matching floor levels of trucks and building.





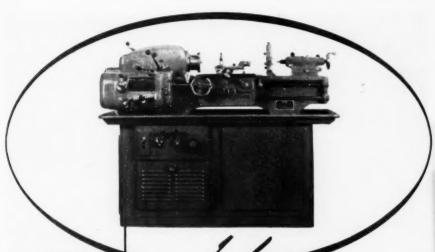
The simple provision of a crossover between crane runways in Reliance's main Ivanhoe Division plant makes possible the interchange of hoists between bays and, consequently, greater flexibility of operation.

Liberal use is made of roller conveyors in the main Ivanhoe plant.



of a manufacturing layout served by a combination of handling units designed to "feed" materials into the production "machine" with such unfailing smoothness as to keep output high and cost low.

Plant column spacing (40-ft. by 50-ft.) underscores the high degree of flexibility sought in the arrangement of work areas through the plant—a feature that is, in turn, supported by the provisions, present and future, which have been made for materials handling. Rails for a 15-ton crane run the entire length (440-ft.) of the center aisle even though for the present only a bay and a half (60-ft.) needs overhead service and gets it with a 5-ton crane. The crane-



FEATURES:

- * Designed and made throughout for PRECISION
- Mardened and precision ground bed ways.
- Sixty-six thread cutting and feed changes without gear change.
- ★ All spindle speeds are stepless, 25 to 2000 RPM, forward and reverse.
- * Choice of M. G. Variable Speed or new Hendey Electronic drive.
- Spindle runs in preloaded, superprecision, anti-friction bearings, both ends.
- * Super-precision lead strew.
- ★ Safety features preventing simultaneous engagements of belt feed with geat feed, and lead screw with rack feed.
- Separate feed rod (independent of lead screw).
- ★ Special clamping device for tailstock.



9"x24" TOOL AND GAGE-MAKERS' LATHE



FEATURING HARDENED & PRECISION GROUND BED WAYS

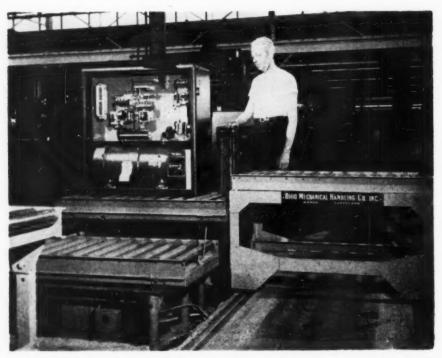
The Hendey 9" x 24" Tool and Gage-Makers' Lathe is a high-speed precision lathe — designed to satisfy the universal demand of expert tool and gage makers for a precision lathe of heavier design and greater adoptability. It has a swing over the ways of 10¼" and over the cross slide of 5½". Maximum capacity of spring collets is 1½". A choice of the M. G. Variable Speed Drive or the new Hendey Electronic Drive is available. This tool and gage-makers' lathe will perform all operations within its scope most activately and efficiently—it will save time and money, and eliminate spoilage of work chargeable to inaccuracy, insensitivity or incapacity of lathe equipment.

Hendey is especially qualified to manufacture such a lathe, because, for more than 70 years it has made lathes which have proved its claim of "Prestige with Production."

Write for free illustrative catalog on the Hendey 9" x 24" Lathe

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Use of two heights of conveyor track in new Reliance plant makes necessary some provision for transfer of materials from one level to the other. This is accomplished, as shown here, by motor-driven "Portelvators," controlled by limit switches which stop equipment at the desired height.

way, building, and foundations have all been designed to carry 15 tons.

Jib cranes, ranging in capacity from 1/2 to 5 tons and providing a lift of from 10 to 13½-ft., serve individual work stations—some 56 in all—throughout the plant.

All material is stored on skid racks in special stock bins which, used in conjunction with a fleet of battery-operated fork-lift trucks, make maximum use of "air rights." As a result, material can be stacked vertically right up to the truss line.

Completed control panels are stored "on edge" between hardboard guides on standard 2-ft. by 3-ft. steel shelving. This edge-storing practice, in contrast to

the former procedure of storing them on the floor with one panel leaning against another, effectively reduces breakage. Savings already secured in this way have more than paid the original cost of these racks, which permit storage of panels singly or in quantity.

The same idea has been extended to the moving of parts to and from individual work stations. In this case, standard warehouse carts equipped with special tote boxes are used to rack the panels "on edge."

Receiving and shipping docks are equipped with hydraulically-operated elevating platforms which make fast work of matching truck and floor levels to expedite loading and unloading oper-



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Jaws are furnished with Sutton diamond serrations. With this full and angular gripping contact, it is necessary to chuck the work only two-thirds as tightly as with a standard collet. This advantage insures long life, reduces scrap, lowers the power demand, and provides reserve of gripping power.

Department MTB-11, Sutton Tool Company, Sturgis, Michigan

SUTTON 🏶 COLLETS





Other materials handling facilities include profusion of jib cranes equipped with electrical hoists. A number of roller conveyor lines have also been installed. Since many operations are performed on parts in transit without removing them from line, two heights of conveyor track, depending on nature of material handling, have been installed so employees can always work without stooping.

ations. They permit "free floating" of the dock with the truck as the weight of the cargo in the truck varies.

Raised before a truck backs in, the dock is lowered when the back of the truck is opened. Solenoid switches (to hold the dock in position should the truck pull out before the dock is raised) control a locking device on the lift cylinder capable of supporting a 20,000 lb. load.

Received in one corner of the plant,



Generously proportioned aisles expedite handling of material by eliminating the need for "jockeying" trucks to get at material. In addition, emergency storage space is available in the aisles, as shown; unusually large quantities of machines in process—resulting from the current defense emergency — are readily accommodated without impeding operations.

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In the Reliance plants material is palletized wherever possible for speedy fork truck-handling. Note protective canopy over lift truck operator. Welded angle irons on a bolted frame provide protection in the event of accidental falls.

incoming materials and supplies are inspected and then transported by crane or delivered by pallets on lift trucks to the stockroom. The shipping area is located in the northeast corner of the building, providing a material flow from west to east.

Housekeeping is also effectively aided by an unusual method used for handling combustible-type rubbish. A number of box-type skids are placed at strategic locations throughout the plant. Periodically, skids containing rubbish accumulated at these "collection centers" are transported by lift trucks or walkalong trucks to an area at the rear of the plant, where the contents are dumped onto other trucks to be carried away. Scrap steel, such as slugs which accumulate in the notching of laminations, are effectively handled in the same general manner.

Frames and other heavy components of larger size Reliance motors manufactured in the Ivanhoe Division are handled by means of floor-operated cranes.

R. R. Roberts has been named manager-finance by K. R. Beardslee, general manager of the Carboloy dept., General Electric Co., Detroit 32, Mich., manufacturers of specialized metals and cemented carbide tools for the metalworking industry.

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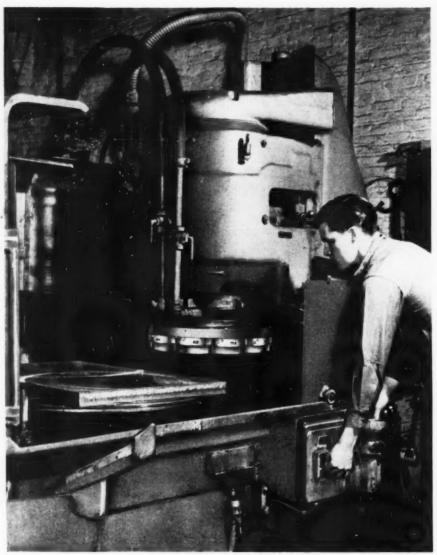
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Milling Fixture with Quick-Acting Feature

By Robert Mawson

A milling fixture must hold the work-piece positively and securely. If the tool does not perform these functions duplicate machined surfaces cannot be obtained. However, the modern tool designer tries to make the tool quick-acting. In other words, the shortest amount of time is consumed in placing the piece for machining and for removing the finished workpiece. Using a well-made quick-acting feature will often mean the difference between an efficient, economical fixture and an ordinary machining tool.

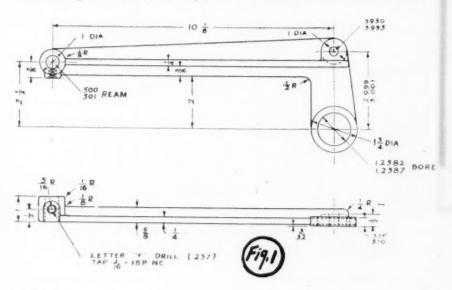
Figure 1 shows a part, made of Aluminum Alloy, of one of the machine tools built by the George Gorton Machine Co. The first machining operation, when producing this detail, is milling the lower faces of the two bosses shown at the right hand of the drawing.

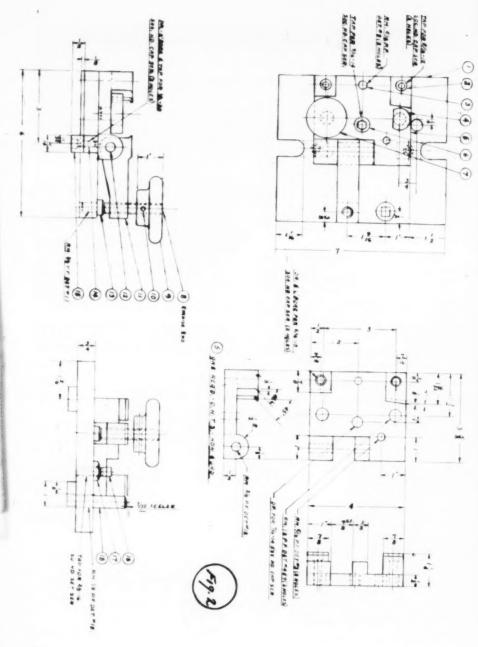
The milling fixture used for this oper-

ation is illustrated in Figure 2 and is made with a C.R. Steel base (1), In the center of the base are then machined two slots 11/16 inch wide and 1-1/16 inch long. In alignment with the slots a groove is then machined to a depth of % inch.

The clamp block (5) is made of tool steel, hardened and ground, and is made with two-45 degree clamping edges, the lower being vertical and the upper surface at an angle of 7 degree taper. With this construction both surfaces contact the workpiece when it is placed in the fixture. On the right hand end of the block is a raised boss in the center of which is machined an opening % inch wide. A % inch hole is then reamed through the two bosses which are formed by making the opening.

In the block are reamed two ½ inch holes to hold 4 and 7, also a hole for 6. Two-5/16 inch holes are drilled





and counterbored through the left hand bosses, one-7/16 inch drilled hole and two-5/16 inch holes are reamed in the clamp block. These various holes are then transferred to the fixture base in the usual manner. The clamp block can now be attached to the base with two-5/16 inch socket head screw (2), one 7/16 inch socket head screw (6) and two-5/16 inch dowel pins.

The rest pad (4) is made of tool steel, hardened and ground, and is placed in the rear ½ inch reamed hole in the clamp block. It will be noticed that the head of the pad is partially machined back to provide clearance for the rib on the casting when placed in the fixture. In the front ½ inch reamed hole in the clamp block is placed the rest pad (7) which is also made from tool steel, hardened and ground.

The clamp (11) is made from hardened tool steel and is machined with a 45 degree workpiece-contacting surface. In the boss at this end of the detail is reamed a % inch hole and at the opposite end of the part is drilled and tapped a 7/16-14 hole. In a % inch reamed hole in the fixture base is driven the screw rest (13) which is made of tool steel, hardened and ground.

When the clamp has been placed in position in the clamp block it can rotate on a steel pin (12) which fits reamed holes in the clamp and block. In the 7/16 inch tapped hole in the clamp is placed a threaded steel stud (8) which has had its lower end cyanized to resist wear. The screw is moved with a steel hand knob (9) which is fastened to the outer end of the screw with a steel pin (10).

In the 1/8 inch machined groove in the fixture base are fastened, each with a socket head screw (14), two machine steel keys (15) which have been machined to have a good fit in the slot of the milling machine table. In a tapped hole in the base is placed a square head set screw (16) under the head of which is a steel jam nut (17). The cutter locating pin (18) is made of tool steel, hardened, and is driven into a 1/2 inch reamed hole in the fix-



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ture base with the end of the pin projecting to the position shown.

To perform the milling operation, the fixture is located on the machine by the two tongues (15) fitting the table slot. Nuts on two T-head bolts, placed in the table slot and through the openings in the fixture base, are then tightened to hold the tool securely is position. Two milling cutters of the correct sizes are placed on an arbor and held in the machine head in the conventional manner.

One of the workpieces, to be machined, is then placed in the fixture resting on the pads (4 and 7) and also on the set screw (16), which has been adjusted and fastened to the correct height. The hand knob (9) is next screwed down which brings the clamp (11) in contact with the piece which is now securely held in the fixture. The cutters are set to the correct height by using a 7/32 inch feeler placed on top of the pin (18) and moving the cutters until they contact the feeler. The machine can then be started in motion

and by feeding the table with the fixture under the revolving cutters the two bosses are milled.

To remove the finish milled Hoop Support Arm it is only necessary to raise the clamp by moving the stud for a short distance.



afternoon, Smith?'

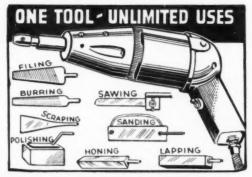
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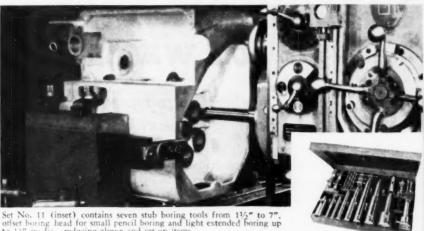
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No.

Hand Hack Saws

1. For best results use correct blade and correct tooth. Among most popular types are blades for: cutting abrasive, tough materials; tool room and general cutting (flexible blade); cutting thin sections, thinwalled tubing; cutting rigidly clamped ma-

2a. A chart for selecting proper tooth. Where two or more tooth specifications are given, determine tooth by size and shape of material to be cut.

Material	Teeth	Strokes Per Minute	
BX	32	60	
Conduit, Rigid	24	60	
Drill Rod	18-24	40	
Iron, Cast	14	60	
Pipe	24	60	
Rails	14	40	
Sheet Metal	24-32	60	
Steel, Machinery	14-18	60	
Steel, Tool	18-24	50	
Structural Shapes, Heavy	18	60	
Structural Shapes, Light	24	60	
Tubing, Light	32	60	
Aluminum	14	60	
Brass and Bronze	14-24	60	
Brass Tubing	24	60	
Copper	14	60	
Structural Shapes	14-24	60	
Asbestos	14	60	
Fibre	14	60	
Slate	14	50	

- 2b. Use fine tooth blades on thin sections, i.e. tubes, etc.
- 2c. Use coarse tooth blades for thick sections to insure chip clearance.

2d. General recommendations.

- 14 Tooth: For cutting stock I" or over in cross section. For soft materials where maximum chip clearance is needed.
- 18 Tooth: For general shop use, when same blade is used on several jobs.

Hand Hack Saws and Power Blades

- 24 Tooth: For cross sections 1/16"-1/4" such as pipe, angles, small
- 32 Tooth: To cut stock up to 1/16" such as light tubing, sheet metal,

It is recommended that at least two teeth should be in contact with the work

Right

Wrong







2e. Illustrating importance of proper tooth selection.

Top, right: At least two teeth contacting each cutting area

Top, left: Coarse teeth straddle, strip out Bottom, right: Coarse teeth, ample chip clearance, smooth, easy operation Bottom, left: Teeth too fine, will clog

- 3. Blade speed should be around 40-60 strokes per minute. High speeds on hard materials dull teeth quickly; softer materials permit greater speeds.
- 4. Feeding pressure should be enough to make teeth cut, otherwise teeth will round over and become dull. Pressure only on forward stroke; moderate pressure on light sections. Heavier work: increase pressure.
- 5. Blade should be taut, but not overstrained. A loose blade will not cut straight. After several cuts with a new flexible blade increase tension slightly. Teeth must point away from handle.

Note: This is the first of a new series of aids to help you in your work. These "know-how" sheets will appear in all future issues of the BLUE BOOK. Tear out and punch holes in the punch hole guides and place in a loose leaf binder for quick, handy reference.

Hand Hack Saws and Power Blades information through courtesy of W. O. Barnes Co., Inc. The Hardness Conversion Table through courtesy of W. O. Barnes and The International Nickel Co., Inc.



BLUE BOOK'S Know How Reference Sheets

- **6a. Start out correctly** by engaging as many teeth as possible; avoid starting cut in a sharp corner,
- **6b.** Support work firmly, chattering or vibration of work piece is destructive to any fine tool.
- **6c.** Cut thin material or light tubing with easy, light strokes; on larger cross sections increase pressure after blade has engaged a large cutting area. Do not place a new blade in an old cut. Use a steady, forward stroke, using entire length of blade. At end of cutting stroke relieve pressure, avoiding dragging teeth over material.

Power Blades

The use of cutting compound is recommended on all ferrous metals except cast iron.

 A Chart for selecting proper tooth and speed for a job. Where two or more specifications are given, determine tooth by size and shape of material to be cut.

Material to Be Cut	Teeth	Strokes
Drill Rod	10	90
Forging Stock, Alloy	4-6	90
Forging Stock, Mild	4-6	120
Iron, Cast	6-10	90-120
Iron, Malleable	6-10	90
Rails	6-10	60-90
Steel, Alloy	4-6	60-90
Steel, Carbon Tool	6-10	90-120
Steel, High Speed	6-10	60-90
Steel, Machinery	4-6-10	90-120
Steel, Stainless	6-10	60-90
Steel, Structural	6-10	90-120
Steel Die Blocks	4-6	60-90
Steel Pipe	6-10	120
Tubing, Thick Wall	6-10	120
Tubing, Thin Wall	14	120
Aluminum	4-6	120
Babbitt	4-6	120
Brass Castings, Hard	6-10	90-120
Brass Castings, Soft	4-6	120
Bronze Castings	4-6-10	90
Bronze, Manganese	6-10	60-90
Copper Bars	4-6	90
Copper Tubing	10	120
Monel Metal	6-10	€0-90

2a. Tooth selection is usually determined by the size and shape of material to be cut, but it may vary according to individual machines. For cutting a variety of metals on short runs it may be advisable to use only one or two tooth specifications.

7. Starting the cut.

Right

Wrong







2b. General recommendations.

- 4 Tooth: Has greater chip clearance which enables faster cutting on large or readily machined metals.
- 6 Tooth: Are frequently used for machining the harder alloys as well as for miscellaneous sawing.
- 10-14 Tooth: The majority of light duty power saws use 10-Tooth and 14-Tooth saws because application is limited to smaller sections.
- 3a. Narrow blade widths are used for normal duty cutting of miscellaneous materials. Wide blades are preferred for heavy duty cutting of multiple bars or larger cross sections.
- 4a. Blade speed in power sawing ranges from 60-150 strokes per min.; for soft metals a speed of 150 strokes max, may be used.
- **4b. Excessive feed** and blade speed increase the rate of cutting but add to blade
- **5a.** Moderate feed pressure for soft materials and light cross sections; moderate feeds also when using a fine tooth to minimize clogging.
- **5b.** Increased feed for harder materials and heavier sections; may be used with coarse tooth blades for maximum production on softer materials.
- 5c. Reduced feed is frequently necessary on positive feed power hack saw machines as cross sections increase and machinability decreases.
- 6. It is good sawing practice to avoid starting the cut on a sharp corner. Support work firmly, avoid chattering or vibration of work piece.



Internal grinding head with the work head swivelled.

Arter Model 103 is one of a line of precision grinders of many types which we have been building for over thirty years. This relatively low-priced grinder is a dual purpose machine that can be arranged as a Plain Cylindrical Grinder or, by changing wheelheads, as an Internal Grinder. It is designed for use wherever a small-incapacity machine is needed as prime equipment or as an auxiliary to larger machines.

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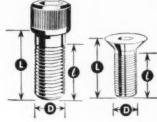
BLUE BOOK'S Know How Reference Sheets

HARDNESS CONVERSION TABLE FOR STEELS (Approximate)

Brir	nell	Rockwell				1
Dia, (mm.) 3000 Kg. 10 mm. Carbide Ball	Hard- ness Num- ber	Vickers Diam. Pyramid (50 Kg. Lead)	C Scale 150 Kg. Brale	B Scale 100 Kg. 1/16" Ball	Shore	Tensile Strength (x 1000 psi)
2.20	767	900	67	*******	95	*******
2.25	745	840	65	*******	91	*******
2.30	710	780	63	******	87	*******
2.35	682	737	62	*******	81	200
2.40	653	697	60	*******		330
2.45	627	667	59	*******	79	323
2.50	601 578	640 615	57 56	******	77 75	297
2.55	555	591	55	******	73	285
2.65	534	569	53.5	*******	71	274
2.70	514	547	52		70	263
2.75	495	528	51	*******	68	254
2.80	477	508	50	*******	67	244
2.85	461	491	48.5	*******	66	235
2.90	444	472	47	********	63	228
2.95	429	455	46		61	219
3.00	415	440	44.5	*******	59	210
3.05	401	425	43		58	202
3.10	388	410	42	*******	56	195
3.15	375	396	40		54	188
3.20	363	383	39	*******	52	182
3.25	352	372	38	110	51	176
3.30	341	360	37	109	50	170
3.35	331	350	35.5	108.5	48	165
3.40	321	339	34	108	47	160
3.45	311	328	33	107.5	46	155
3.50	302	319	32	107	45	150
3.55	293	309	31	106	43	145
3.60 3.65	285 277	301 292	30 29	105.5	41	142
3.70 3.75	269 262	284 276	27.5 26.5	104	40 39	133
3.75	255	269	25.5	103	38	126
3.85	248	261	24	101	37	122
3.90	241	253	23	100	36	118
3.95	235	247	22	99	35	115
4.00	229	241	20.5	98	34	112
4.05	223	234	18.5	97.5	33	110
4.10	217	228	17.5	96	33	108
4.15	212	222	16	95	32	105
4.20	207	218	15.5	94.5	32	102
4.30	197	207	12.5	92.5	31	97
4.40	187	196	10	90.5	29	90
4.50	179	188	8	88	27	87
4.60	170	179	5	86.5	26	82
4.70	163	171	3	85	25	79
4.80	156	163	1	82.5	24	75
4.90	149	156 150	********	81 79	23	73
5.00 5.10	143	143	******	79	21	67



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WHY IS IT THAT 75% OF ALL SPECIAL SOCKET SCREWS ORDERED FROM SPS HAVE ODD THREAD LENGTHS?

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The length of the screw thread is measured from the extreme point to the last usable thread and shall be as follows:

For American National — Coarse Thread Series ℓ = 2D + $\frac{1}{2}$ " (where this length of thread would be greater than half the screw length).

 $\ell = \frac{1}{2}L$ (where this length of thread would be greater than 2D + $\frac{1}{2}$).

For American National—Fine Thread Series $\ell = \frac{11/2}{2}D + \frac{1}{2}$ " (where this length of thread would be greater than three-eighths the screw length).

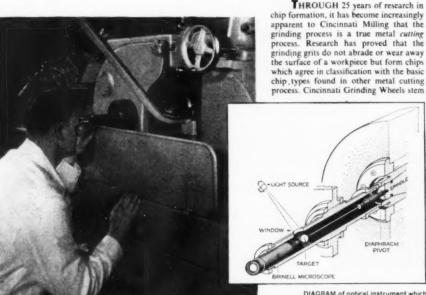
 $\ell = \frac{3}{6}$ L (where this length of thread would be greater than $1\frac{1}{2}D + \frac{1}{2}$).

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Screws too short to allow application of these formulas shall be threaded as close to the head as practicable.

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RESEARCH SCIENTIST shown above is using optical instrument to check tiny deflections resulting from grinding forces.

DIAGRAM of optical instrument which was developed by research laboratory of the Cincinnati Milling Machine Co.

from a frank recognition of these basic facts.

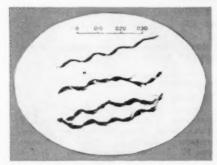
This new concept is the beginning of a whole new approach to grinding wheels—the development of the grinding wheel as a true cutting tool. And it is a development you might expect from Cincinnati Milling, with the world's largest background of research in metal cutting.

For you, this means grinding wheels developed and tested over a period of several years on the basis of true function—as true cutting tools forming true chips.

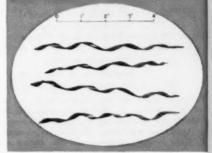
Furthermore, available to you is a field organization of trained machinists who know grinding and grinding machines as well as grinding wheels. For a demonstration on your own machines of how to get the most out of Cincinnati Grinding Wheels, just write, wire or phone us.



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CONTINUOUS GRINDING CHIP obtained from grinding operation on SAE 1112 steel, selected to indicate the free chip formation possible under good grinding conditions.



CONTINUOUS MILLING CHIP obtained from helical milling operation on SAE 1112 steel. Note similarity in shape to the grinding chips shown in the photomicrograph to the left.

FREE BOOKLET Coming off the presses now is a brand new booklet, "A New Concept In Grinding Wheels." It contains many remarkable microphotographs, as well as a complete picture story of how Cincinnati Grinding Wheels are made. A copy is yours for the asking. Just write Sales Manager, Cincinnati Milling Products Division, The Cincinnati Milling Machine Co., Cincinnati 9, Ohio.



A special report by the editors of MACHINE and TOOL BLUE BOOK

Report number 24

Drilling machines..part 5

This is the twenty-fourth in a monthly series of special reports discussing various types of machine tools. Included in this month's special report on drilling machines are:

- 1. Sharpening of drills
- 2. Descriptions of late model drilling machines.
- 3. Specifications of American-built machines.

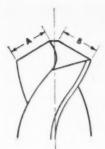
Previously published reports discussed: 1. Thread Rolling; 2. Power Press Brakes; 3, 4, 5. Milling machines; 6. Honing, Lapping, and Superfinishing; 7. Automatic Screw machines; 8. MAPI Replacement Formula; 9, 10. Chucking machines, Turret Lathes, Hand Screw machines; 11. Broaching machines; 12. Shapers, Slotters, Keyseaters; 13, 14, 15. Lathes; 16. Planers, 17. Gear making machines; 18, 19. Boring machines; 20. Drilling machines, parts 1, 2, 3, 4.

Sharpening of drills

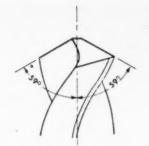
THE TWIST DRILL is probably the most mistreated cutting tool in the machine tool industry. Although it is called on to perform the most strenuous work, often under the most adverse conditions, little thought is given to care of sharpening. The writer remembers, as a rookie in a large factory, when he was initiated into the mysteries of drill sharpening, free hand, without a word of instruction. Studying a "good" point helped some, but countless drills, pieces scrapped, and tempers could have been spared with even brief directions.

When a drill is being ground, four

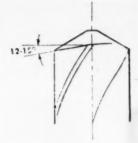
things must be remembered: Pointangle, point thinning, cutting drill edges and lip-clearance. Each lip has to be the same length, figure 2. (For nomenclature, see figure 1.) If unequal, oversize holes will result, one lip will do most of the cutting and repeated sharpening will be necessary. Lips must also be at the same angle, figure 3, and at the right clearance, figure 4. depending on the material being worked on. Clearance is that relief behind the cutting edges. With too small a clearance. the drill rides and will not cut; too much clearance makes it "hog in." Clearance should be enough for free cutting without weakening the cutting



2. A must equal B.



Both lips must be at same angle.



Correct clearance.

edge, increasing gradually to the center from the periphery. Standard acceptance is 7° at the periphery, increasing toward the center so that the angle of web intersection on the lips will be 130° to 135° to the cutting edge. If unequal clearance is allowed, there is likely to be frequent chipping of the

cutting edge or splitting of the body of the drill.

Web thinning

When the web it too thick, more power is required for drilling. The point will be weakened if too thin. Since the web increases in thickness toward

1. Drill definitions

Back taper—Known also as longitudinal relief, most drills, except the very small ones, are made slightly smaller in diameter at the back or shank end, than the point. It is usually about .0005 per inch length.

Chisel edge angle—(center angle) This is the non-cutting portion of the drill point. It is the angle included between the chisel edge and the cutting edge as seen from the end of the drill. The recommended angle of this edge with the cutting lip is 135°.

Margins—The narrow parts along the cutting edges of the drill flutes; that portion of the land which is not cut away to provide clearance. It forms the full diameter of the drill.

Lands—Providing strength and rigidity, they are that portion of the periphery of the drill body not cut away by the flutes.

Lips—The cutting edges of a drill. They extend from the chisel edge to the periphery.

Lip relief angle—The angle measured between a tangent on the surface back of the cutting edge at the periphery, and a plane at right angles to the axis of the drill.

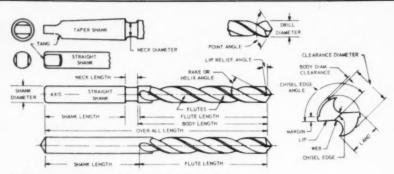
Point angle—The included angle between the lips; usually 118° on standard drills.

Point or lip clearance—The clearance back of the cutting edges or lips, varying usually from 7° to 12°.

Flutes—The spiral grooves cut for cutting edges (helical and straight) providing clearance for chips and allowing coolant to reach the cutting edges.

Flute length—The length from the corner of the cutting lips to the extreme back end of the flute. Sometimes it is called length of twist.

Overall length—On straight shank drills, the length from the end of the full diameter of the shank end to the outer corners of the cutting lips, not including the conical cutting point, is called the overall length.



1. The nomenclature of a standard twist drill.

Clearance—That portion of the drill body that has been cut away so it will not rub against the walls of the hole, thus reducing friction.

Clearance diameter—The diameter over the cut-away portion of the drill land. Spiral angle—The angle of the flute with the axis of the drill. If the angle is small, the drill is said to have a slow spiral. If great, the spiral is fast. Axis—The longitudinal center line through the drill.

Rake angle—In relation to the work, the rake angle is that between the leading edge of the land and the axis at the drill point.

Web—Central portion of the body that joins the lands. The extreme end forms the chisel edge.

Web thickness—The least thickness of the web at a given point. This varies sometimes along the length of the drill, according to certain firms' practice. Web thinning—Reducing the web thickness at the point to reduce drilling thrust, is called web thinning.

Helix angle—That angle of the leading edge of the land with the axis of the drill. The helix angle is identical with the rake angle of the cutting edges at the periphery of the drill. A straight flute drill would have zero-degree helix angle.

Tang—The flattened end of the shank, intended to fit into a driving slot in the drill holder or socket. Tangs are most common on taper shanks.

Point—The cutting end of a drill, made up of the ends of the lands and the web forming the lips. In form it resembles a cone, but it departs from a true cone in order to furnish clearance on the cutting edges.

Shank-That part of the drill by which it is held and driven.

Body—That part of the drill that extends from the shank or neck to the outer corners of the cutting lips.

the shank and does no cutting, it is important that it be as thin as necessary. Point thinning, as this thinning of the web is termed, should be held to the center and not carried too far up the drill, yet far enough not to form an abrupt wedge. A good general rule to remember is that the web should be thinned to about 1/8 of the thickness of the drill.

Although machine grinding is to be preferred to hand grinding because of greater accuracy, the thinning operation isn't difficult to learn and can be performed by any competent tool grinder. Figures 5 through 9 illustrate

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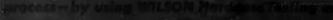
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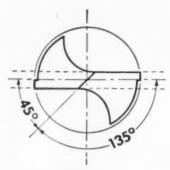




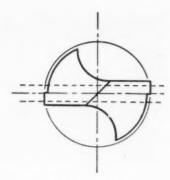
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5. Correct clearance.



6. Web too thick.

some of these problems. Figure 10 shows the web in a drill.

Different types of web-thinning are in common use, and every drill press operator has his own tricks, but figure 11 shows the type that is probably the most common. The length "A" is usually ½ to ¾ the length of the cutting lip.

Sometimes extending the thinning out to the edge, in order to change the shape of the chip, is best, figure 12. Then an effective rake is given the entire cutting length.

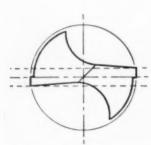
A type of thinning called the notched, offset or crankshaft point is shown in figure 13. The included angle of the point can be adjusted to each job, about 135° being the most common. In the first point-surfaces it is best to have a chisel-edge angle of about 90° to 100° and then the two notching cuts are

made to meet at the center, forming a new chisel-edge angle of about 120°.

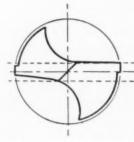
The angle of the notching cut, in figure 13, shown as 55°, will vary some, but if reduced much below that figure will not accommodate the chips made by the short center-cutting edges as a result of the shallow notching. All of the former chisel edge should be removed. Also the cuts should just meet, not pass each other. Remove the same amount of stock from each cutting edge. The shape of the thinning should never interfere with the flow of chips.

Chip removal

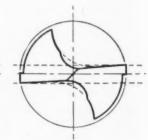
When pressure from cutting-fluid is increased in oil feeding drills, figure 15, it helps wash the chips back through the flutes. Pressures of 500 to 1000 pounds p.s.i. are used. Generally it's



7. Web out of center.

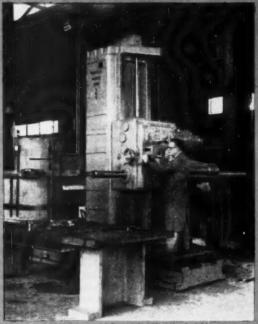


8. Lips out of index.



9. Correct.

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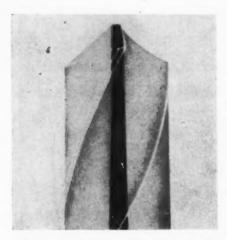




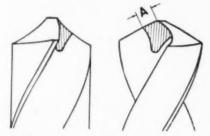


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 The metal column that separates the flutes is called the web.

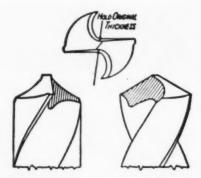


 One way of thinning a drill point when web is too thick because of repeated re-pointing.

necessary to have an automatic shutoff valve to keep from spraying the oil into the air when the drill is out of the hole.

Feed variations will sometimes change the shape of the chip. The "right" shape is the one that flows back out of the flutes the easiest. This would likely be the cone shaped ones, the single curls.

Sometimes it is necessary to grind chip breakers in the drill point. Here too, machinists have their own pet ways. The simplest form is probably that shown in figure 16, which consists of a



12. Undercut thinned point makes fine, curled chip.

flat along the cutting edges, reducing the rake of the drill. Usually the chip breaker is ground somewhat like that in figure 17. The purpose of this type of breaker is for the chip to curl onto itself and break. Keep the depth of the breaker at a minimum to keep from cutting through the margins or forming pockets where chips might wedge.

If it's advisable to split chips lengthwise, figures 18 and 19 show two styles. Grooves in opposite flutes are not equidistant from the axis of the drill. These should be made with a wheel dressed to a radius to avoid localization of stresses in any sharp corners.

. The most common method for causing the chips to break is to decrease the rake angles of the cutting lips. This bends the chips more sharply. Thus, grinding a drill takes considerable skill. Grinding is done along the front face of the cutting edges, with the drill tilted so as to get the right rake. Very little grinding is needed, both lips being ground symmetrically. Rake angles must not be made negative as this reduces drill life and efficiency.

Clogging of flutes can sometimes be remedied by increasing the feed. This thickens the chips. On screw machines, drills with less rake on the lips and slow

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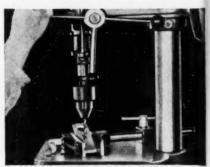
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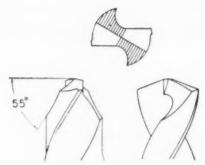
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Perfect for angle drilling



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 Offset, notched or crankshaft type of point.



14. The result of two types of incorrectly sharpened drills. The one at the left has lips of equal length, but unequal angles, At the right is shown lips at equal angles but of unequal length.



15. An oil hole drill model showing how holes extend the full length down which oil is forced to the cutting edge. These are good for deep holes, especially on automatic machines.

helix angles are used since drilling is here limited to high speeds and low feeds, the drill having to work in conjunction with one or more other tools. The slower angles have less rake and do not require grinding on the face of the cutting edges. In deep hole drilling, chips were a big problem until a special drill with a thicker web and faster spiral was perfected. By thinning the web, this type works very satisfactorily. If holes to be drilled are 3/4" or larger, an oil hole drill can be used to advantage, figure 15, but smaller holes than that call for special deep hole drills.

As the diameter of holes get smaller, the chip spaces or flutes are too small to allow the chips to pass out of the deep hole properly. The only answer is to repeatedly lift the drill from the hole to "clear" it, and start afresh.

Three and four groove drills

Three and four groove drills, figure 20, are used for enlarging holes previously drilled, cored or punched They're often called core drills. Their use assures a better finish and great productivity. Their action is much the same as rose reamers. Often it is practical to use core drills in the place of roughing reamers. The increased number of lands and cutting edges make the tendency to wobble, score sides of the hole or cut oversize, much less. It is important to have them properly sharpened. Cutting edges should be of the same length and have the same point angle. It is recommended that a dial indicator or similar device be used for checking lengths of cutting edges, especially after resharpening.

Jig drilling

Rapid and accurate location of holes and the guiding of drills, by the use of jigs, have effected tremendous savings in the metalworking industries.

Rigidity is very important. Work should be supported without bending.

Space should be provided between work and the drill bushing, so that chips can be ejected here instead of through the bushing itself. However, the bushing should not be placed so far away from the work that the drill bends below it, cutting oversize, or breaking.

NOT TOO LITTLE...
NOT TOO MUCH...BUT

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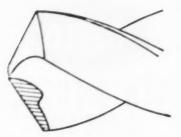
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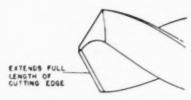




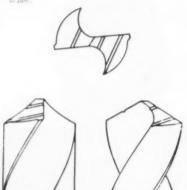
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16. Flat type of chip breaker. It is important in any type of chip breaker that the breaker does not extend through the margin of the drill.



- 17. The proportions of the dimensions shown in this radius undercut type are subject to wide variations and have to be worked out for each job. This type extends the full length of the cutting edge.
- Grooves in lip of drill split chips lengthwise.



For angular entry, the bushing should nearly touch the work.

The dimensions of the bushing are important. Its length should be enough to guide and hold the drill solidly; too short a bushing lets the drill bend. If too long it cuts down on the effective length of the drill. For average helix angles, the length of jig bushings should be from 1-3/4 to 2-½ times the diameter of the drills. A minimum clearance between drill and bushing should be from .0005 to .001 inch.

Lubricants

Lubricants have many uses in drilling; among them are: Cooling of both cutting edges of tool and work being machined; lubrication of chips, thus aiding in their elimination; improving finish of the work.

The following lubricants for certain materials are suggested.

Steel, ordinary: Soluble oil, sulfurized oil, high e.p. value, mineral oil.

Steel, hard: Soluble oil, sulfurized oil, turpentine.

Monel metal: Soluble oil, sulfurized mineral oil.

Wrought iron: Soluble oil, sulfurized oil, high animal oil content mineral oil compound.

Stainless steel: Sulfurized mineral oil, soluble oil.

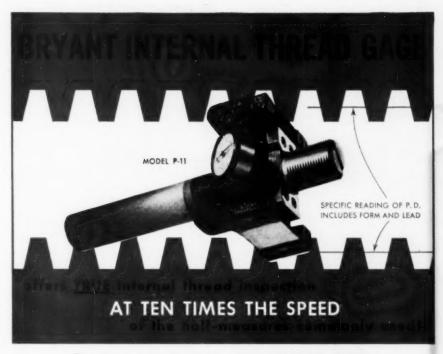
Copper: Soluble oil, winter strained lard oil, oleic acid compounds.

Aluminum and its alloys: Soluble oil, kerosene and lard oil compounds, light non-viscous neutral oil, kerosene and soluble oil mixture.

Cast iron: Dry or with a jet of compressed air for a cooling medium.

Brass: Dry, soluble oil, kerosene and lard oil compounds, light non-viscous neutral oil.

Oftentimes a good lubricant is not good as a coolant and vice versa. Water is probably the best coolant there is, yet it is no good for lubrication. Sulfurized oils have both qualities and



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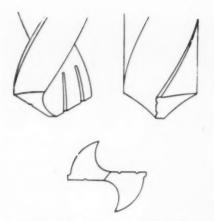
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Please send me illustrated folders giving full information on the Bryant Portable and Bench Thread Gages.

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- Grooves in web of drill, as in lip of drill, should be spaced alternately.
- 20. Three and four flute drills are designed for enlarging punched, cored or drilled holes. They are unsuited for drilling the initial hole.



are especially good in steels when a nice finish is required. Soluble oils are good where finish isn't too important. Any water-soluble compounds should contain enough alkalinity to prevent rusting of the work. Animal oils become rancid and should be avoided except in cases where they alone will suffice. Straight mineral oils are fine for medium heavy jobs, though not as good as sulfurized.

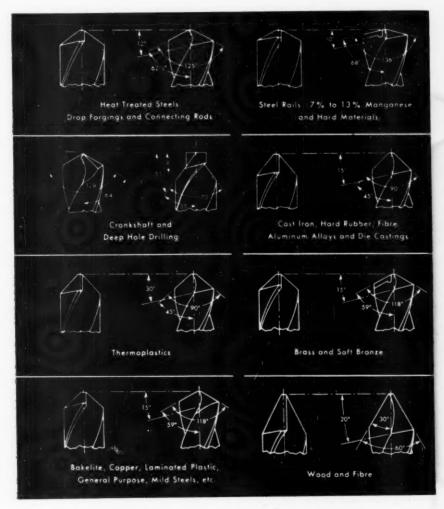
Speeds and feeds*

No fast rule can be given for speeds and feeds. The type of metal, hole depth, lubricant, quality of holes, setup, type of machine, its condition, and many other influences enter in. At any rate, these two items should be determined

*(It is suggested that reference be made to earlier articles in this series for any specific data on special materials.)



"Excellent speech, boss. Hope I didn't snore."



21. Suggested points for production drilling of common materials.

through trial in each case and by sound judgment.

Feeds are largely governed by drill size and the composition and hardness of the material being drilled. However, a general rule is to use a feed of .001 to .002 inch per revolution for drills smaller than 1/8 inch, .002 to .004 for drills 1/8 to 1/4 inches, .004 to .007 for 1/4 to 1/2 inch, .007 to .015 for drills

Valuable general drill information in brief

Improper cooling—Turning a stream of cool liquid or plunging a drill into liquid after it has become heated causes small checks and cracks resulting in rapid wear and breakage. The heat results from sharpening or drilling. Back lash in machine causes breakage—If there is any spring or play between the upper part of a machine and the table, the drill cannot begin to cut until the feed-pressure has taken up. The feed is constant until breakthrough when the resistance to penetration is suddenly off and the drill "hogs in," resulting in breakage. Any movement of the table with reference to the upper part of the machine while drilling, throws the spindle out of alignment with the hole and bends or cramps the drill.

Adjust speeds, feeds to metal—Drills tempered for drilling hard materials are sometimes too brittle for softer and tougher materials. Difficulties can often

be corrected by adjusting feed or speed or both.

Speed needed in drilling small holes—Too slow speeds in drilling small holes with hand feed causes breakage, especially when the drill breaks through. The operator cannot gauge the feed when the drill is running too slow. Automatic machines—High speed and light feed are recommended for automatics where holes seldom exceed four diameters of the drill in depth. For deeper holes, an oil hole or oil tube drill, figure 15, will often be found advisable.

Drilling in hard material—Reduce speed and use a positive feed. Try a flatter drill point of about 140° included angle. Grind a flat along the cutting edge to reduce rake. Shorten flute length to about half the original length if job permits, thin web and repoint 140°. Try different lubricant such as turpentine, sulfurized oil, etc.

Chipping of lip or cutting edge—Too much feed or lip clearance. Reduce feed, rearing.

Breakage in brass or wood—Chips clog flutes. Increase speeds, use special design drills.

Breakage of outer corners of cutting edges—Material has hard spots, scale or sand inclusions. Too much speed. Wrong lubricant. No chip clearance. Lubricant not reaching cutting edge.

Rough hole—Dull or improperly ground drill. Lack of lubricant or wrong one. Improper setup. Too much feed,

Drill breakage—Too little lip clearance. Spring or back lash in press or work. Too low speed in proportion to feed. Dull drill. Improper chip clearance.

Chipping of margin-Oversize jig bushing. Use proper size.

Broken tang—Imperfect fit of taper shank in socket, due to nicks, dirt, burrs or worn socket. Get new socket or ream old one.

1/2 to 1 inch, and .015 to .025 for those larger than one inch. Alloy and hard steels should be fed at a lighter rate while such materials as brass and aluminum or cast iron can be drilled at a much heavier feed than those suggested above.

Torsional strength of drills

The tremendous demands placed upon the modern high speed twist drill are perhaps greater than those placed upon any other small tool used in manufacturing. Tests conducted at the engineering laboratories of the University of Michigan showed the average torque load, when drilling steel with a 1" diameter drill, is about 800 inch pounds. The deflection at the point, under this load, when recorded at a 30" radius, showed a movement of approximately 0.030" at the periphery of the drill. The



ITS POPULARITY reflects its quality

First choice the world over for light- and medium-duty drilling! That's the Jacobs Plain Bearing Chuck. Its rugged strength, high-precision accuracy and tremendous grip put it in a class by itself.

Jacobs Chucks are stocked and sold by your Industrial Supply Distributor.

The Jacobs Manufacturing Co., West Hartford 10, Conn.

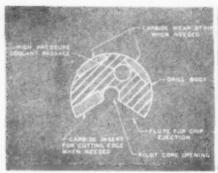


The strongest, truest grip ever developed in drill chuck history is what you get when you use the Jacobs Ball Bearing Super Chuck for your heavyduty drilling.

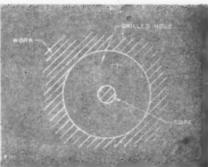
IF IT'S A

JACOBS

IT HOLDS



22. The unique design of the target gun drill is shown in a cross section view at the cutting end.



23. The cross section of a hole being drilled by the target gun drill. Note the solid core.

average torque at which a 1" high speed steel drill would break was found to be 5,500 inch pounds with a deflection of about 1/8" at the drill periphery.

From these tests it was concluded that this size of drill has ample strength to withstand any torsional strains to which it is apt to be subjected. Should the torsional load increase, due to dulling, from 800 inch pounds to say 1200 inch pounds, there would still be a safety factor of 4½ plus.

The target gun drill, figures 22, 23, is a new development and said to be a distinct advance in the art of drilling deep holes. Because of the core feature

of the gun drills there is no dead center area with zero surface speed. This permits the use of a carbide insert at the cutting edge when desired. The solid core feature of holes (note illustrations) performs the function of acting as a continuous pilot for the drill.

References:

Mass.

Ace Drill Corp., Adrian, Mich.

National Twist Drill & Tool Co., Rochester, Mich.

Cleveland Twist Drill Co., Cleveland, Ohio. The Carborundum Co., Niagara Falls, N.Y. Threadwell Tap and Die Co., Greenfield,

Chicago Latrobe, Chicago 10, Ill.

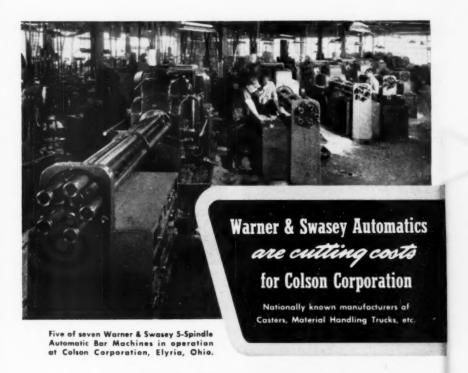
Descriptions of late model drilling machines

Baker heavy duty drilling machine

This model No. 314-A of Baker Bros., Inc., Toledo, Ohio, has ample capacity to drive three inch diameter high speed twist drills, to the limit of their efficiency in steel. It is also adapted to boring, counterboring, facing, forming and tapping operations.

The vertical frame design, to give increased flexibility, is of two piece design. The lower frame which bolts to base carries either standard plain table or compound table. The forged high-carbon spindle is multi-splined. Six quick changes of speeds are provided.

The machine has a multiple depth stop accurately tripping the feed at different points where quick changes of tools are used. Spindle or hand feeding is provided.



THE COLSON STORY

- * Setup time cut more than 50% on new Warner & Swaseys.
- * Production up 7 to 8 times on lots of 500 to 10,000 pieces.
- * "Progressive" setups are much more practical on Warner & Swaseys.
- * Small lots are economically practical on this new CAMLESS Automatic.
- Machine operators appreciate easy access and interchangeability of tooling.
- ★ Both management and operators approve— NO CAMS TO CHANGE.
- ★ Five repeat orders prove the profitability of Warner & Swaseys.



YOU CAN MACHINE IT RETTER, FASTER, FOR LESS WITH WARNER & SWASEY TURRET LATNES, AUTOMATICS AND TAPPING MACHINES

Wales-Strippit drilling machine

The drilling machine manufactured by the Wales-Strippit Corp., N. Tonawanda, N.Y., is specially designed, precision engineered, and ruggedly constructed to meet the precision requirements of locating, drilling and reaming holes in material of practically any length and up to 36" wide.

Accuracy is the primary consideration in manufacturing, combining simplicity

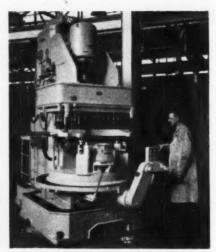


of operation, easier locating, faster drilling and reaming and very close tolerance production.

With the Bridgeport boring head, it is possible to bore up to 5" in diameter with the same precision and speed as drilling smaller holes to guaranteed tolerances of ± .003" from a base point in a 36" x 48" work piece. Variation of this model (3660) can be engineered to customers' requirements.

Natco C4A

The heavy duty Holesteel vertical machines C3A and C4A single spindle, are made for general purpose, heavy duty drilling, boring, tapping, reaming, counterboring, facing and trepanning. They are made by the National Auto-



matic Tool Co., Inc., Richmond, Ind.

These machines are equipped with quick change speed heads which give seven spindle speeds with a single set of change gears. This is accomplished by shifting the two levers located on the front of the head. All gearing is of hardened steel, lubricated by a cascade system. Pick-off gears are accessible for changing the range of speeds for different types of materials.

A centralized pushbutton control station is used for routine operation of these machines. The head automatically stops after returning to the starting position. Model C3A is available with an adjustable knee-type table. The table has a wide coolant channel which drains into the base of the machine and a vertical screw adjustment of approximately 10 inches. Two sizes of bases are available; the smaller is used for stationary fixtures and the larger for rotating tables or sliding fixtures.

Levin micro drill for small holes

Designed for drilling as small as .002", these micro drill presses made by Louis Levin & Son, Inc., 782 E. Pico Blvd., Handle Bigger Jobs!

Sealed Precision



This new, low cost production giant is offering industry new versatility, greater capacity, added ruggedness and power. Redesigned and improved to handle those beavier jobs, it will perform a wide variety of drilling and tapping operation with greater accuracy and dependability. Check these remarkable advantages: precision ground alloy steel spindle; 4 ball bearings sealed and permanently lubricated; precision bored bearing seats assure perfect alignment; massive close grained head casting eliminates vibration; sturdy cast hinged belt and pully guard; easily adjustable feed tension with pin for positive positioning; table raising mechanism.

Specifications: ¾" capacity in cast iron; spindle has #2 Morse Taper; speed range 450 to 1965 R.P.M.; spindle travel 5"; base to spindle 44½"; table to spindle 20"; overall height 69"; 3½" column. Available without foot feed or with production type base.

Model C3088—18" Drill Press (Illustrated) Less Motor and Switch....

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Los Angeles 21, Calif., have their accuracy assured by precision collets for holding the drills. However, standard drill chucks may be used. The former types are the same that are used in the Levin bench lathes. These collets have a runout of less than .0002" and are available from stock in sizes as small as .004".

Absence of a sliding quill and splines eliminates several sources of drag and insures a spindle sensitive enough for the smallest drills made. It is not recommended that drills larger than 1/4" be used.

Atlas drill presses

Economical, available in high and slow speeds, with a choice of full-tilting or production oil tables, Jacobs chuck or No. 1 or No. 2 Morse taper spindle, there's an Atlas drill for most every type of shop and application, within the machine's capacity. Made by the Atlas Press Co., Kalamazoo, Mich., the new floating drive, exclusive with Atlas, consists of a six-splined spindle and a steel drive sleeve that floats on two large deep-grooved ball bearings for longer service life. This transmits turn-

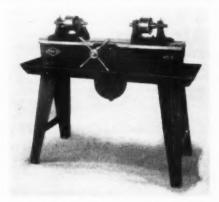


ing power only to the spindle. All belt pull is taken to the head through the drive unit. Two more ball bearings float the spindle free from the quill. The head, table, column and base are extra heavy for accurate work. Top of the base is precision ground and slotted to serve as an auxiliary table. There is a quick-positioning direct-reading depth control stop and built-in switch, coordinate clamp locks and adjustable feed tension. High speed drills have four step pulleys and the slow have five.

Frew duplex horizontal

This machine by The Frew Machine Co., Philadelphia, Pa., is designed for drilling, reaming and counterboring operations on opposite ends of metal products, a high rate of production being obtained, due to the movement of the heads which is entirely automatic, the operator simply having to load and unload his fixture.

The machine is all motor driven, each head having its own motor, and a separate motor for the feed. The heads are moved in and out by means of cams,

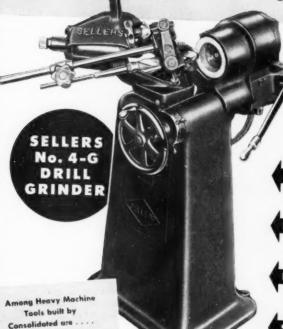


one at either end of the machine carried on a heavy shaft, which runs through the bed and turns in Timken bearings. The cam shaft is driven by means of worm and worm gear, through suit-

Want better drill performance?

Then try grinding your drills on the grinders used and recommended by leading drill manufacturers....

SELLERS DRILL GRINDERS



Because Sellers correctly ground drills can be safely run at maximum speeds, they increase machine output

LENGTHEN DRILL LIFE

Because with Sellers grinding, angles and clearances are correct, drill lips cut equally and efficiently, wear is minimized, less stock is removed when grinding, doubling drill life.

INCREASE HOLES PER GRIND

Because Sellers correct grinding reduces wear, drills remain sharp longer, require less grinding

REDUCE OVERHEAD AND LABOR

Because Sellers precision grinding increases machine production, drilling costs are reduced.

LOWER ASSEMBLY COSTS

Because under- and over-size holes can be eliminated, reaming or bushing correction is avoidable, saving time and labor

SALVAGE DAMAGED DRILLS

Because burned and broken drills ordinarily scrapped can be satisfactorily reclaimed and returned to profitable service.

A self-contained dry grinder, the Sellers No. 4-G has a proved record of top efficiency for grinding right hand and flat twist drills, 2, 3 and 4 lip up to 2 diameter. It has an actual maximum capacity for 2 and 4 lip drills up to 3" diameter and 3 lip up to 21/16" diameter. Lips are ground to equal length, angle and clearance. Clearance as produced by the Sellers Method, automatically determined by the machine for different size drills, is sufficient to insure free cutting without weakening the cutting edges. Part replacement is negligible but, if ever required, replacement parts are always available. Complete information will be furnished upon request

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ROCHESTER, NEW YORK

able gear reductions, and is provided with pick-off gears for changing the number of strokes per minute of the heads. The front ends of the head units are provided with large finished flat surfaces, to which multiple spindle heads can be attached.

Ames bench drilling machine

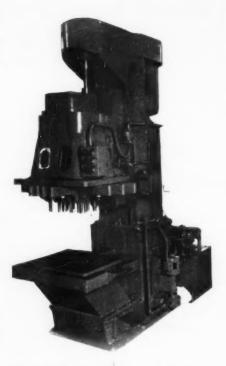
This machine, made by Ames Precision Machine Works, is designed for drilling holes from 1/4" down to those made with drill wire, ground flat and pointed.



The spindle is hardened, ground and lapped, and runs in two hardened steel bearings without lubrication. The operator depresses lever to feed drill downward, and a spring beneath the pulley returns the spindle to normal position when pressure is released. An adjustable collar regulates spindle travel. The base is of cast iron, machined top and bottom, and is available in sizes for one to seven drill heads, used where different sizes of holes are to be drilled at one time or in succession, Single spindle drills are driven direct with a small motor, but when two or more spindles are used on one base, the bench countershaft is required.

Fox multiple spindle

The multiple spindle machine by Fox Engineering Co., Jackson, Mich., Serial



30182, E-60-H vertical adjustable spindle, has a head counterbalanced hydraulically, accommodating 12"x18" hole pattern, with 16 spindle pinions for $1\ 1/8"$ universal joints. The $20"\ x\ 24"$ table is 28" above the floor.

These hydraulic feed units are all of the slide and slide base type, with hardened and ground ways, and with hydraulic pump and its drive motor separate. The 60-H units have Vickers 2-feed hydraulic panels, forward and reverse action solenoid-controlled, feed cam-controlled. The 63-H unit has a Vickers single-feed panel, all motion control by solenoids.

These Fox 60 type drilling machines feature ruggedness and simplicity of design, yet are designed for high production drilling of duplicate parts.



Creased Strength* WINS THREE FALLS OUT OF THREE!

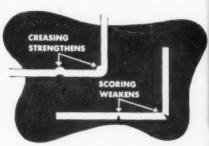
We packed an ordinary light bulb in a C.S.* Buffinton Made-Rite Mailer with newspaper, dropped it three times onto concrete pavement from the top of a five-story building (without opening the box) — screwed it back into the lamp, switched it on, and sat down to write: "This is the toughest mailing box of them all!"

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Specifications of American-built drilling machines

aker Brothers,	Inc.			Toledo, Ohio
Type and Model	C=Capacity in SAE 1035 T=Taper S=Spindle Feed	Dist. Center of Spindle to Face of Ways- ST=Spindle to Plain Table SB=Spindle to Base	W=Work Surface Table V=Vert. Adj. of Table	S = Range of Speeds F=Feeds
Heavy Duty Drill Model 150	C=1%", T=No. 4 M.T. S=11	D=11": ST=34": SB=48%"	W=15" x 16"; V=18"	S=48 to 1120 r.p.m. F=.005 to .143 per rev.
Model 314A	C=3"; T=No. 5 M.T. S=16"	D=12%"; ST = 39" (plain, 29%" compound); SB=51"	W=16%" x 23"; V=18" W=16" x 36" compound	S=6-43-232 F=.005"026" and .017"088"
Model 150	C=1½"; T=No. 4 M.T. S=11"	D=11": ST=34": SB=48½"	W=15" x 16"; V=18"	S = 151 to 632 F = .0039" to .0342"
Model 217	C=2": T=No. 5 M.T. S=12"	D=12¼"; ST=39½" SB=51"	W=16%" x 23" V=18"	S=76 to 614 F=.0057" to .0925"
Model 321	C=3": T=No. 5 M.T. S=16"	D=12%": ST=39½"; SB=50";	do	S=27 to 220 F=.0057" to
Model 422 Also available for Multiple Spindle Applications	C=4½": T=No. 6 M.T. S=16"	D=12¼": ST=38 &": SB=49"	do	S = 20 to 165 F = .0103" to .1670"
Heavy Duty Single and Multiple Spindle Drill Model 26-HO	C=3": T=No. 5 M.T.	D=15"; ST=32¼"; SB=50¼"	W=23" x 25½ (plain; dia. index table = 24", 30", 36";) V=16" (Saddle travel)	S=21 to 251 special speeds available.
Model 36-HO	C=5"; T=No. 6 M.T.	D=18"; ST=33 %"; SR=51%"	W=25½" x 23" (plain; dia. index tables= 30", 36", 42") V=24" (Saddle travel)	S=25 to 316. Special speeds available
Extra Heavy Duty Drilling and Boring Model 30-HO-4	Adapted to extra heavy drilling and boring and sweep facing	D=20"	V = 24" (Saddle travel)	S=8.5 to 69
Model 60-HO-4	do	do	do	do
Two Spindle Inverted Type 30-HO	C=Two 4" drills T=No. 6 M.T.	D=12"; 8T=10" Center dist. two spindles = 13"	V=52" (Saddle travel)	S=36 to 227



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5	30-32-36-48-	7 16	12-16-18-22-24-27-28-30-32-36-		16-18-20-24
3	80	.,,,,	40	1-13/16	8-10-12-14-
6	36-40-48-56-60	1/2	12-14-16-18-22-24-26-27-28-30-		16-18-20
6 7 8	32-40		32-40	1-7/8	8-10-12-14-
8	24-30-36-38-	9/16	16-20-24-27-28-30-32-40-48		16-18-20-24
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5/64	60-64 72	1	10-12-16-18-20-24-27-32-40	2-3/16	12-16
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7/64	48-56	1-1/8	8-10-14-16-18-20-24-32	2-5/16	14-16-18
1/8	32-40		8-10-12-14-16-18-20-24	2-3/8	12-16-18
5/32	32-36-40	1-3/16		2-1/2	8-10-12
9 64	36-40	1-1/4	8-10-14-16-18-20-24-32	2-9/16	18
11/64	36	1-5/16	12-14-16-18-20-24-32	2-5/8	12-16-20
3/16	20-24-32	1-3/8	8-10-14-16-18-20-24	2-3/4	16
13/64	32	1-7/16	8-10-12-16-18-20-24	2-7/8	8-12-16
7/32	24-28-32	1-1/2	8-10-14-16-18-20-24-28	3	8-16
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	28-32-40	1-11/16	10-12-14-16-18-20-24	1 4	8-12

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The Frew Mac	he Frew Machine Co.				
Type and Model	S=Size of Drill, Largest SW=Swing Over Bed	M=Max. and Min. Dist. Between Spindle Ends T=Taper in Hole	L=Length of Feed (each head or spindle)	SB=Width of Spindle Belts P=Power Feed to each Head	
Duplex Horizontal Drills No. 0	S = ♣": SW=9"	M=23½" and 2"; T=No. 2 M.T.	L=10%"	SB=2½"	
No. 00-C	SW = 7 %" (fixture plate)	M=36" and 12"; T=No. 3 M.T.	Work Stroke of each head is %"	Motor Driven	
No. 1-S	S=1%"; SW=14"	M=49" and 10%" T=No. 4 M.T.	Countershaft Speed is 400 r.p.m.	SB = 3 1/2"	

Atlas Press Co.			Ke	alamazoo, Mich
Type and Model	C=Center to C. of Spindles D=Drills to Center S=Spindle Travel T=Taper	CC=Column to Center of Spindle TC=Dist. Table to Chuck BC=Base to Chuck T=Table Travel	W=Work Surface, Table S=Range Speeds	Remarks
Drill Press, Floor 15" Full Tilting Table	D=15"; S=4"; T=No. 1 or 2 M.Tr; or No. 70 to ½" chuck	TC=41"; BC=46" T=41"	W=10" x 10" S=9-580 to 5200, high 9-400 to 4400, slow	Available in high speed or slow speed.
Prod. Oil Table	do	TC=40 %"; BC=46" T=40 %"	W=10½" x 16½" S=9-580 to 5200, high; 9-400 to 4400, slow	Available in high or slow speed
Drill Press, Bench 15" Full Tilting Table	do	TC=12"; BC=16"; F=12"	W=10" x 10" S=9.580.5200 high; 9.400 to 4400, slow	do
Prod. Oil Table	do	TC=11 %"; BC=16"; T=11 %"	W=10" x 16½"; S=9-580-5200, high; 400-4400 low	do
Prod. Base Drills 15"	do	BC=24½";	W=16" x 18"; S=9.580.5200, high 400.4400, low	do
Multiple Spindle Drill Press 4 Spindles	C=12"; S=4";	CC=7½"; TC=26"	W=21" x 49"; S=9-580-5200, high 440-4400, low	do
3 Spindles	C=17"; S=4";	do	do	do
2 Spindles	C=13"; S=4"; T=1/2" J. Chuck or No. 1 or No. 2 M.T.	do	W=21" x 26" S=9-580-5200, high 440-4400, low	do
Bench Drill Press 12%"	D=12 %"; S=3" T=No. 70 to %" J. Chuck	TC=11"; BC=14½" T=11"	W=8" x 9" S=580 to 5200	

Fox Engineering C	Fox Engineering Co. Jackson, Mich.					
Type and Model	D=No. Drills in Steel DC=No. Drills in Cast Iron	B=Base Work Surface Head size as required for work to be drilled	FT=Dist. Head to Table F=Dist. Head to Base S=Head Travel CL=Center Line to Column Face	S=Head Motor Speeds F=Feeds, Max. & Min. In. per Min. T=Table Work Surface		
Vertical Hydraulic Multiple Spindle Model 60-H Type K	D=9; DC=14	B=41" x 46"	F=48%"; S=18"	S=1200 r.p.m. F=21.2" to .495" T= Special for each		
Type L	D=12; DC=18	B=41" x 41"	do	S=1200 F=18.2" to .424" T=do		
Type Q	D=18; DC=28	B=41" x 36"	do	S=1200 F=12.8" to .299" T=do		
Type R	D=30; DC=46	B=48" x 42"	do	S=1200 F=9.55" to .22" T=do		
Model 157-H	D=10½" Drills DC=10¾" Drills	Head drilling area is: 10" x 16"; 12" x 18"; 10" x 32" or 12" or 16" round; or 18" x 24" fixed center head	FT=17½" to 29½" (cabinet) FT=10½" to 35¼" (low base with adj. knee); FT=16½" x 28¼" (low base with box table) S=12"	S=280 to 1750 F=28" to .463" T=27" x 27" (cabinet) T=21" x 36 (low base, adj. knee)		
Multiple Drilling Tapping Model 40	D=10¼" DC=10½"	Head drilling area is: 8" x 14", 10" x 16", or 12" round	T=10" min., 26" max. CL=14%"	S=400 and 800 F=.002", .004"; .006" T=18" x 24"		

ational Auto	matic Tool Co.	,		Richmond, In
Model and Type	T= Travel of Head or Slide D=Drilling Area of Boxes	C=Center of Spindle (or Head) to Face of Column H = Height, Work Surface of Table, max. and min.	WT = Work Surface, Table WB=Work Surface, Base	D=Dist. Spindle Nose (or Bottom o Slide, or Bottom of Head Flange) to Table, max. and min. S=Speeds F=Feeds
Heavy Duty C3A Seven Speed	T=18"	C=14"; H=44%", 34%"	WT=40"x23"; WB=44"x28";	D=39&", 5&"; S=25 to 308; F=1" to 10" per
C3A Fixed Center	T=18"; D=18"x22" to 24"x36"	H=44%", 34%" Size, mounting surface of Head Slide, 25"x38"	do	D=40%", 12%"; S=24 to 308; F=1" to 10"
C3B Adjustable	T=18"	C=15"; H=44%"; 34%"	do	D=62%"; 44%"; S=374 to 1504 F=1" to 10"
C4A Seven Speed	T=21"	C=17*	WB=50"x44"	D=54h", 33h" S=25 to 308 F=1" to 10"
C4A Fixed Center	T=21"; D=24"x28" to 36"x28"	Size, Mounting Surface of Head Slide, 30" x46"	do	D=61¼", 40¼" S=24 to 308 F=1" to 10"
C4B Adjustable	T=21"	C=17"	do	D=60¼", 40¼" S=375 to 1514 F=1" to 10"

ational Autom	Richmond, Inc			
Type and Model	F=Feed Travel of Table S=No. of Spindles T=Top of Table to Head Flange SB=Spindle Nose to Base ST=Spindle Nose to Table	C—Center Head to Face of Column FT — Floor to Top of Table MD=Max. Drill Dia, Std. Spindles	WB=Work Surface of Base W=Work Surface Table H=Drilling Area of Head S=Speeds F=Feeds	Remarks
Light Sensitive Multi Driller or Tapper Model A-33A and A-33B	S=10; T=21½" F=2½" for Hand-Foot, Air-Feed F=4" for Air-Oil Feed	C=514"; FT=41½" up; 29½" down	W = 9"x12"; 11 = 54 "x934"; S = 650-3550	Model A-33A available in combination Hand-Foot and Air- Oil Feed, or Hand and Foot Feed. Model A-33B is Air Feed.
High-Speed Sensitive Multi Driller or Tapper Model 5H Standard	S=12, T=25" max. 8%" min. (Hand & Foot) F=23" max. 7" min. (Hydraulic) F=2%" (Hand and Foot) F=6" (Hydraulic)	C=7¼" MD=5%"	W = 14"x18"; H = 7"x12"; S = 268-3140 F= ½" to 30" per min.	Available in Hand and Foot operated, or Hydraulically operated.
Model 5H Heavy Duty	S=8; and T= Same as above	C = 8½": MD = ½"	W = 17"x28"; H=10"x16"; S=206-2735 F=½" to 30"	
Model 6H Standard	S=24; F and T = Same as above	C=8½"; MD=%"	$W = 17'' \times 28''$; $H = 10'' \times 24''$; S = 268-3140; $F = \frac{1}{2}''$ to 30''	
Model 6H Heavy Duty	S=12; F and T= Same as above	C = 8½"; MD = ½"	W = 17"x28"; H = 10"x24"; S = 206-2735; F = ½" to 30"	
General Purpose Drilling Machines Model C-225H Single Spindle	F=12" (Head), S=1's max. 46'\s'' min ST=44'\s'' min.	FT= 32½" max. 20½" min.; C=10"	WB = 17"x153%"; W = 25"x23"; S = 100 to 1300; F = 1" to 10" per min.	3 sizes of heads available on Model C-225H: No. 1 has 12" round drilling area with 8 drives;
Model C-225H Fixed Center	F=12" (Head); S=20 SB=564" max. 4434" min. ST = 4234" max. 1844" min. (SB, ST measured from bottom of slide)	do	da	No. 2 has 10"x16" rectangular drilling area with 16 drives No. 3 has 10"x16" area with 20 drives

	F = Feed Travel			
Type and Model	of Table S=No. of Spindles T=Top of Table to Head Flange SB=Spindle Nose to Base ST=Spindle Nose to Table	C=Center Head to Face of Column FT=Floor to Top of Table MD=Hax. Drill Dia. Std. Spindles	WB = Work Surface of Base W = Work Surface Table H = Drilling Area of Head S = Speeds F = Feeds	Remarks
Model C-225H Adjustable	F=12" (Slide); S=8 SB=56%" max. 44%" min. ST=42%" max. 18%" min. (SB, ST measured from bottom of bead flange.)	do	do S = 280-2950	75000
Model C-2A Seven Speed	F=18" (Head) S=1, SB=55\\(^{\mu}\) max. 37\\(^{\mu}\) min., ST=39\\(^{\mu}\) min.	C=10"; FT=37½" max. 25½" min.	WB = 36" x20"; W = 32" x22"; S = 57 to 5110; F = 1" to 10" per min.	Model C-2 types A and B available with head drilling.
Model C2A Fixed Center	F=18" (Slide); SB=62%" max. 44%" min.: ST=46%" max. 16%" min. (SB, ST measured from bottom of slide)	do	do	Areas from 12"x17' 10 19"x28".
Model C2B Adjustable	F=18" (Head); S=16 SB=6.24" max. 44%" min.; ST=46%" max. 16%" min. (SB, ST measured from bottom of head (lange)	C=12", FT=37½" max. 25½" min.	s=190-1255	
Note	complete line of F-9HU, F-13HU, F	kes a representative HOLE UNITS for s -17HU; a complete models C2FT, C3FT	special applications, line of FLOOR type , C4FT, C5FT; HOL	including models Drillers, Borers, EWAY Processing

Ames Precision	Machine Works	W	ltha	m 54	, Mass.
Bench Drilling Machines	Company makes a machine designed for drilling holes made with drill wire, ground flat or pointed.	from	1/8"	down	to those

Louis Levin &	Son, Inc.		L	os Angeles, Calif
Type and Model	D=Drill Capacity C=Collet Sizes Available	Dist. Between Table and Spindle	T=Table Size TT=Table Travel	Speed
Micro Drill Press	D=As small as .002" C=As small as .004"	4"	T=3 %" x 4"; TT=1½"	3 speeds-1000, 1725 and 3000

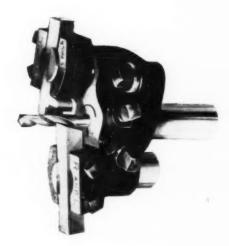
ational Automo	tic Tool Co.			Richmond, Ind
Model and Type	H=Head Center to Face of Column T=Travel of Head TA=Taper	TT=Top of Table to Bottom of Drill Spindles (or Bottom of Head Flange) max. min. TB=Top of Base to Bottom of Drill Spindles (or Bottom of Head Flange) max. min.	WT=Work Surface, Table WB=Work Surface, Base	S=Speeds F=Feeds (per rev. of spindle)
Multi Drillers Type C12 10"x16" Rect. Heads Bored for 20 Spindles	H=12"; T=21"	TT=28%" to 0"; TB=54%" to 33%"	WT = 23"x25"; WB=18 %" x19 %"	S= 615-2244 or 3 double speeds, (615-1143) (862-160 (1206-2244) F=:0006** to:011'
Type C13 14" Round Head Bored 18, 12"x18" Rect. Head Bored 24; 16"x24" Rect. Head Bored 24	H=12"; T=18" TA=No. 1, 2, 3 MT	TT=42" to 7"; TB=62%" to 44%"	WT=23"x40"; WB=22"x26"	S=3 double speed (364-606) (510-849 (714-1189) F=.0011" to .019"
Type C13 10"x40" Rect. Head Bored 32	TA= No. 1, 2 MT	TT=45%" to 10%" TB=65%" to 47%"	do	S=3 double speed (477-730) (699-102- (936-1434) F=.0009" to .0143
Model B-14	H=151/4"; T=24" TA=No. 1, 2, 3, 4	TB=55" to 31"	WB = 33" x33"	S=3 speeds low: 181,272,372, or 3 speeds high; 367,550,752 F=.001" to .026"
Model B-16 Std. 26" Rd. Head for 22 Spindles	H=15½"; T=24"	TB = 43%" to 19%"	WB = 33"x33"	S=3 Speeds: Low=181,270,371 High=367,548,750 Also Independent Changes F=.001" to .0262'
Model B-16-Std. 18" x48" Head Bored for 42 Spindles	H=15%"; T=24"	do	do	do
Model B-16 Std. 22"x38" Head Bored for 34 Spindles	H=16%"; T=24"	do	do	do
Model B-16 Hvy. Duty 26" Round Head Bored for 12 Spindles	H=15\%"; T24"	TB=41" to 17"	do	S=3 Speeds; Low=168,251,344; High=262,392,536 Also Independent Changes. F=.003" to .0283"

Wales-Strippit Co	rp.	North Tonawanda, N. Y.			
Type and Model	C=Capacity T=Table Size	S=Slide Travel B=Table to Bridge Clearance ST=Spindle Travel	S=Speeds T=Taper	Remarks	
Drilling Machine Model 3660	C=36" x 48" max. hole pattern without shifting work on rail slide T=44" x 72"	S=48"; B=34"; ST=5"	S=385, 600, 935, 1420, 2240 T=No. 2 M.T.	Machine locates, drills, reams and bores holes. Holes up to 5" may be bored with boring head.	

CHANGED

RANDIN TOOLS

Manufacturers of



273

CATALOG

IN TEN SECONDS FOR RIGHT OR LEFT HAND TURNING

1825 BRISTOL STREET PHILADELPHIA 40, PA.

R AND L TURNING TOOL New Combination Tool PATENT FEATURE

In addition to replacing an assortment of fourteen tools, this New Combination Tool

fourteen tools, this New Combination Tool is the only Right and Left Hand Tool on the market. It can be changed from Right to Left in ten seconds, and vice versa,

TANTALUM CARBIDE BACKRESTS

The extremely hard surface of the Tantalum Carbide backrests, or burnishers, makes it impossible to pick up the metal and mar the surface of the work with scratches or blisters.

The cutting tool can also be furnished with a Carboloy Tip to take care of extremely difficult jobs.

This is particularly true of the tougher metals such as Nickel Alloys, Bronze, Nitralloy and Stainless Steel.

We can also furnish roller backrests as shown on page 277.

NO MISALIGNMENT

There are no Rollers or Roller Shafts to wear and cause misalignment of the rolls with the work.

Extremely fine adjustment is provided on both the cutting tool and the pressure of the burnishers.

The method of mounting tool bits provides longer life, since the tool bits are ground only on the top side, or end.

Due to the shape of the tool less crossslide clearance is required, creating a saving in time besides in many cases permitting work to be done with cross-slide tools while the piece is being drilled or turned.

When used as a Turning Tool the R and L "Combination Tool" produces a highly polished surface, true to size and straight.



ROUGH AND HEAVY CUTS AS WELL AS FINISHING CUTS

May be used for roughing and finishing cuts. Heavy cuts are possible with this tool because thrust is in direct line with the backrest at all times. Finish is excellent, free from chatter marks.

CONSTRUCTED WITH BEST POSSIBLE CARE AND MADE OF FINEST STEEL

These tools are constructed of a very tough, heat treated alloy steel and guaranteed not to bend or give way in any manner.

All essential parts of the tool are ground to extreme accuracy to provide perfect alignment at any point of adjustment.

In addition to the utmost care used in manufacturing these tools—they have been tested on actual work for a period of two years before they were put on the market. Developed in a Screw Machine Shop for practical results.

Any of these tools can be furnished with different diameters of shanks than those listed as regular, at no additional cost, if specified at the time of order. This makes it possible for the user to have a number of different diameter shanks if necessary for the same tool, which enables the user to use the tools on different size machines.

BALANCED TURNING TOOL

By replacing the burnishers with extra tool holder (Part No. 3, Page 289) furnished with each tool, it is readily converted into a balanced turning tool with two cutting edges.

Used mostly for roughing cuts, where there is a desire to remove metal quickly, the cut is divided between two tools.

wise permits two diameters to be turned to any length within its capacity.

TURNING TOOL WITH DRILL

Drilling is readily accomplished at the same time the piece is being turned. or a piece is centered while turning to provide perfect concentricity.

The "Floating" construction allows the drill to be centered accurately, overcoming any discrepancies in the machine.

This turning and drilling combination is a distinct advantage on multiple spindle machines where lack of sufficient number of positions sometimes necessitates subsequent operations to complete the piece.

Here again the adjustment lengthwise provides a greater range of distance between the cutting edge of the tool and the drill.

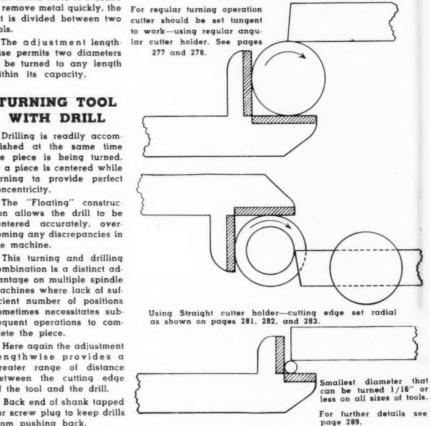
Back end of shank tapped for screw plug to keep drills from pushing back.

SETTING AND ADJUSTING THE "R AND L" TURNING TOOL

Setting the "R and L" Turning Tool is as easily accomplished as any other turning tool. However, due to its ability to handle a great variety of operations, new users of these tools may find the following suggestions helpful.

Plain Turning with Burnisher

To set for plain turning, the tool bit is generally ground to a rake angle of about ten degrees. (This angle is sometimes



varied to suit the machinability of the material used.)

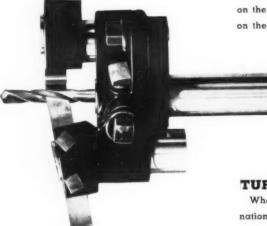
The tool is then placed in line with the center of the stock, and by loosening the clamping screw, the holder is swung around to approximately the required diameter. Finer adjustments can then be made with the two set screws which hold the tool bit, until exactly the required diameter is obtained.

The burnisher is then brought into position, and by loosening the clamping screw. and the two set screws, it is adjusted so that BOTH faces of the burnisher rest LIGHTLY on the surface of the work just turned. Care must be taken that the burnisher is not set ahead of the cutting tool. About 1/64" to 1/32" behind the cutting edge of the tool is usually right for most jobs.

Care should be taken to get a smooth even cut before adjusting the burnisher. since the burnisher will not produce a smooth finish on a surface that is not properly turned.

On jobs requiring a radius instead of a sharp corner, it is necessary to set the burnisher back far enough, so that it rests on the straight part of the work, instead of on the radius. See page 280.

> On long, slender work, where there is a tendency of the stock to spring away from the tool while setting for the required size, it is advisable to feed only a short length. and set the tool as outlined above.



As set for Drilling and Turning at one operation. Note ample room for chip clearance.

TURNING AND DRILLING

When using a drill or other tool combination with turning, the drill should first be set central, by using the floating feature provided, before any adjustments are made on the turning tool. A perfectly fitted bushing should be used, for it is essential, as in drilling by any method where accuracy is required, that the drill be held parallel to the axis of the work.



Backrest and Cutting Tool set for Right Hand Turning.

See note page 284

Backrest and Cutting Tool set for Left Hand Turning.



R AND L ROLLER BACKRESTS

We are now prepared to furnish all sizes of R and L Turning Tools with Roller Backrests that are INTERCHANGEABLE with the Standard Tantalum Carbide type of Backrest.

Prices on R and L Roller Backrests:

00			\$20.50
			22.50
			27.50
2A			31.50
3			38.00
	2	2A	2A

Patented

No extra charge if tool is ordered with rollers instead of Carbide Backrest.

The complete Carbide Backrest consists of the following assembly of parts as listed on Page 289 of this catalog.

- 1 No. 4 Backrest Holder
- 2 No. 7 Tool Adjusting Screws
- 1 No. 9 Backrest
- 1 No. 10 Rocker Shoe

The prices of these parts assembled are the same as the complete Roller Backrest.

Prices on Rollers and Pins on page 278

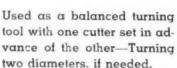
ROLLERS AND PINS

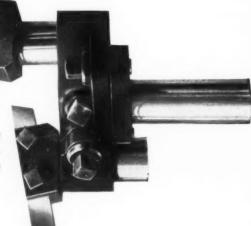
These Rollers and Pins are hardened, ground, and lapped in pairs, and are always shipped in that manner to the customer. Great care should be taken that they are kept that way in assembling. Price list at right.

	No. 00	No.		No. 2A	No.
Rollers and Pins.	7.00	10.50	13.00	14.50	17.00
Roller Shanks	7.00	7.70	8.50	10.00	12.00
Roller Clamps	7.00	7.70	8.50	10.00	12.00
Clamp Screws.	.55	.65	.75	.85	.90



Used as a Balanced Turning Tool either Right Hand or Left Hand.







Turning shoulder concentric with stock diameter.

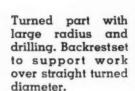
Turning and Centering.

CATALOG

MACHINE and TOOL BLUE BOOK

27

Turning Two Diameters.



October, 1952

R and L TOOLS



Turning two diameters while drilling or reaming.

Turning one diameter — chamfering two corners, facing end of part along with drilling or reaming.

CATALOG

MACHINE and TOOL BLUE BOOK

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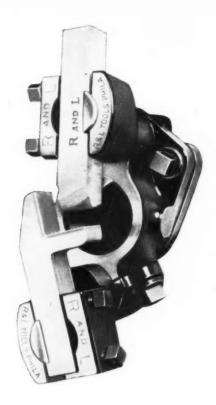


Turning and forming special shape on end of part while drilling or reaming.









DON'T DO IT THIS WAY

The above is a reproduction of a photograph of a tool sent to a customer and returned to us as unsatisfactory. Note tool has been ground to cut radially like a lathe tool instead of to cut tangent as shown on pages 275 to 277.

The most expert workman could not produce good work with the tool as shown above.

Advertisement

R AND L BACKREST HOLDER FOR TURRET



CARBIDE BACKREST HOLDER

This holder can be fitted with either a Roller Backrest or a Carbide Backrest same as used on our R and L Turning Tools. If fitted with Angular Cutter Holder same as used on our Turning Tools it makes a substantial single point turning tool, or centering and facing tool.

Prices for Holder ONLY as shown Above

No.	00	with	5	8"	dia.	shank	\$20.50	each
No.	1	with	3	4"	dia.	shank	22.50	each
No.	2	with	1"		dia.	shank	28.00	each
No.	3	with	1-1	/2"	dia.	shank	38.00	each

Larger sizes made to order.

HOLDER

ROLLER BACKREST

Roller or Carbide Backrest for Above

No.	00		\$20.50	each
No.	1	4**************************************	22.50	each
No.	2		28.00	each
No.	3		38.00	each

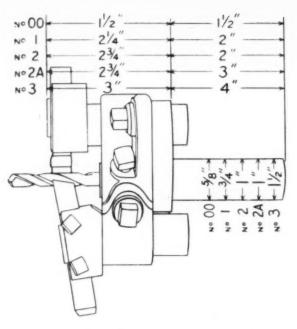
Angular Cutter Holder for Above (Complete)

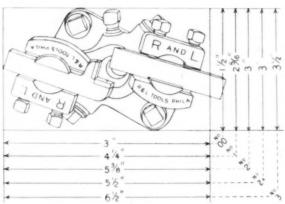
No.	00		10.85	each
No.				
No.	2	*************	15.85	each
No.	3		20.65	each

Larger sizes made to order.

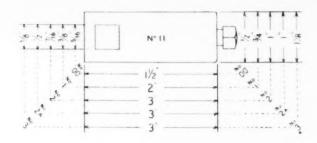


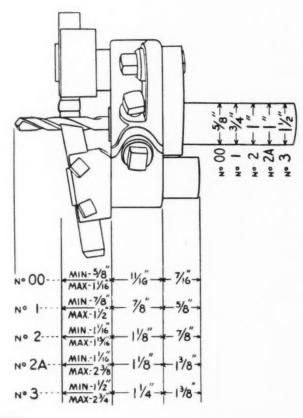
SINGLE POINT TURNING TOOL

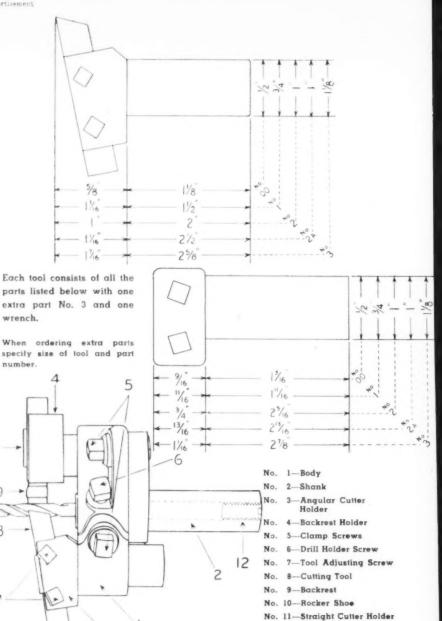




HOLE DIAMETER				
No. 00	No. 1	No. 2	No. 2A	No. 3
1/2"	56"	1"	11/4"	15%"







No. 12-Shank Screw

PRICES, SIZES AND CAPACITIES OF R AND L TURNING TOOLS

S	ize	Diam. of Shank		ngth of iank	Diam, that can be turned with- out drill	Diam, that can be turned with drill		Hole thru Shank	Price
No.	00	5/8**	11/2	' long	0" to 1 diam. x 134" long	0" to $\frac{7}{18}$ " diam. x 1" long		diam, tapped	\$75.00
No.	1	3/4''	2"	long	0" to 15" diam. x 214" long	0" to ½" diam. x 1¼" long		diam. tapped	\$85.00
No.	2	1"	2"	long		0" to 34" diam. x 134" long		diam. tapped 3/4"—20	\$105.00
★No.	2Å	1"	3"	long	38" to 13" diam. x 3½" long	³ 8' to 1 ³ / ₁₆ " diam. x 2 ¹ / ₄ " long	11"	diam. tapped 3/4"—20	\$125.00
★No.	3	115"	4''	long	15" to 112" diam. x 4" long	15" to 11/2" diam. x 21/2" long	116	diam. tapped	\$145.00

Above prices apply also if furnished with Roller Backrests, see Page 277.

★ On No. 2A and No. 3 sizes we can furnish at additional cost extra Carbide Backrest to enable the tool to turn down to ½" diameter. Price—No. 2A, \$16.75; No. 3, \$20.00.

PRICES ON PARTS R AND L TURNING TOOLS

			No. 00	No. 1	No. 2	No. 2A	No. 3
1. Bo	ody		29.50	36.50	50.50	57.50	78.50
2. Sh	ank		9.10	10.50	13.30	14.50	17.50
3. Ar	ngular Cutter Holder(2)	ea.	8.75	10.25	13.00	14.25	17.25
4. Bo	ckrest Holders		8.75	10.25	13.00	14.25	17.25
5. Cl	amp Screw(4)	eα.	.60	.65	.80	.85	.90
6. Dr	rill Holder Screw(2)	ea.	.35	.45	.60	.65	.70
7. To	ool Adjust. Screw(6)	ea.	.20	.20	.35	.40	.50
8. Cu	utting Tool(3)	ea.	.50	.75	1.05	1.45	4.00
9. Bo	rckrest		9.10	10.50	13.30	14.50	17.50
10. Ro	ocker Shoe(3)	eα.	.90	1.05	1.25	1.40	1.60
11. St	raight Cutter Holder		2.30	2.80	4.00	4.50	5.65
	nank Screw		.20	.30	.50	.55	.65
13. Se	et Screw for Straight Cutter Holders		.30	.35	.50	.55	.65
14. Bi	nder Pins for Straight Cutter Holder		.35	.45	.60	.65	.70

Price	of Cutting	Tools w	ith	Carboloy Tip:
5/16"	Square	No.	00	\$10.00
3/8"	Square	No.	1	11.25
7/16"	Square	No.	2	12.75
1/2"	Square	No.	2A	14.00
5/8"	Square	No.	3	17.75

The length and diameter of shanks listed above are regular stock sizes. Ordinarily, we can substitute some other length and diameter of shank if there is not too great a difference. Where something decidedly different is required, there will be a slight extra charge.

State if you want the tool for cutting steel or other metals—Bronze, Brass or Aluminum.

REPLACING TANTALUM STANDARD TOOL BITS CARBIDE TIPS ON BACKRESTS

Sizes of	One	Two
Tools	Tip	Tips
No. 00	\$3.75	\$4.50
No. 1	4.50	5.50
No. 2	5.00	6.00
No. 2A	6.00	7.00
No. 3	7.00	8.00

REFINISHING CARBIDE BACKRESTS

No. 00	
No. 1	
No. 2 5.00	
No. 2A 5.50	
No. 3	

Uses tool bits of standard size - no special shapes to grind or buy.

No.	00	Square	.50	each	
No.	1-38"	Square	.75	each	
No.	2	Square	1.05	each	
No.	2A1/2"	Square	1.45	each	
No.	358"	Square	4.00	each	

PROPER CARE OF TANTALUM CARBIDE BACKRESTS

Ordinarily there is very little wear on these Backrests. However, there is some. especially when used on some grades of material and we find it advisable to smooth them up from time to time, using a diamond hone for this purpose. We find the most convenient size is the one made by the Norton Company 4" long x 1" wide x 30" thick, with diamond insert 2" long x 1/32" thick. We use the 100 grain grade for roughing and either 220 or 440 for finishing.

(Hones shown on page opposite.)

Worn backrests, if returned to us, will be re-conditioned and returned at a very nominal cost.

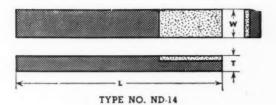
ONE TOOL REPLACES THE ENTIRE ASSORTMENT OF FOURTEEN TOOLS LISTED BELOW

Roller Box Tool	\$70.50
Centering and Facing Tool	20.50
Knee Tool	34.25
Pointing Tool	33.25
Back Rest	24.50
Floating Drill Holder	11.50
Balancing Turning Tool	44.00
	\$238.50
Same for Left Hand	\$238.50
	\$477.00

One R and L Tool of a similar size (No. 1—\$85.00) will take the place of above assortment of regular tools costing more than five and a half times as much.

NORTON DIAMOND HONES With One Insert—2" Long.

Standard Diamond Concentration



Size in Inches T W L	Depth of Diamond Section	Net Price Each	
3/8 x 7/16 x 4	Length of Diamond Surface 2"	Due to increase in cost of diamonds, we are	
3/8 x 7/16 x 4	Depth of Diamond Surface 1/32" or 1/16", as desired	able to quote prices only on application.	

R and L TAP AND DIE HOLDER

The R and L Tap and Die Holder HAS AN ENTIRELY NEW RELEASING MECH-ANISM and can readily be changed for Left Hand Threading:

NO SPRING PLUNGERS TO WEAR OR BREAK. NO SMALL SCREWS TO WORK LOOSE.



R and L RELEASING DIE HOLDERS FOR ACORN DIES

These holders have the well known releasing clutch construction same as used on our releasing Tap Holder.

A keyed washer is used between the adjusting cap and the lock nut. Tightening the lock nut will not change the adjustment of die.

Our new — No. 000 size is extremely sensitive for small size dies when used on High Speed machines.

A substantial spanner wrench is furnished with each holder.

Average maximum threading capacity as listed will vary depending on the nature of the material being threaded and whether a fine, coarse, or medium thread is being cut.



RELEASING TYPE Patented

Prices	on	R and	L Tap	and Die	Holders
No.	000	Dia. of	shank	5/8"	\$27.50
No.	00	Dia. of	shank	5/6"	27.50
No.	1	Dia. of	shank	34"	33.75
No.	2	Dia. of	shank	1"	46.25
No.	3	Dia. of	shank	11/4"	105.00
No.	4	Dia. of	shank	11/2"	.135.00

NON-RELEASING TYPE

No. 000 Dia, of shank. %"	\$13.50
No. 00 Dia. of shank %"	13.50
No. 1 Dia. of shank 34"	17.00
No. 2 Dia, of shank 1"	23.50
No. 3 Dia. of shank 11/4"	54.00
No. 4 Dia. of shank 11/2"	72.50
Adapters for Acorn or Button Di	es:
No. 00	\$12.00
No. 1	12.00
No. 2	15.00
No. 3	
No. 4 Prices upon req	uest.

		Ca	pa	ity		No. of Die Needed	Price
No.	000	1 16	to	3	3/8	1	\$40.50
No.	00	1/4	to	3/8	5/8	2	40.50
No.	1	1/4	to	7	3/4	2	46.25
No.	2	3/8	to	1/2	1	3	60.75
No.	3	5/8	to	11/6	13/4	4	121.50
No.	4	11/6	to	11/2	11/2	5	170.00

In ordering the above Tap and Die Holders, please mention if for regular or short threads. We have a few customers who want socket head screws with U.S. Standard thread. When ordering please specify which thread is required.

INSIDE CONSTRUCTION R AND L TAP AND DIE HOLDER

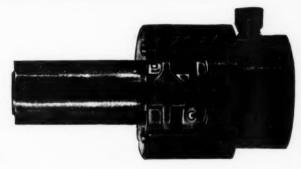


Figure 1.

Ready to start threading operation.

clutch slightly engaged at C.

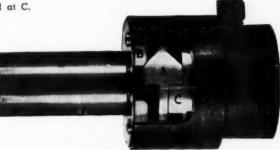


Figure 2.

Instantly engaged to full contact between A and C as soon as tap or die engages work.



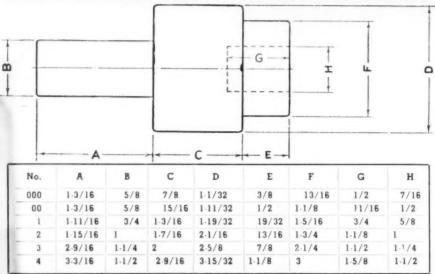
Figure 3.

Fully released showing ample clearance between contact points of clutch preventing re-engagement or hammering of clutch points in case turret advances slightly after clutch releases.

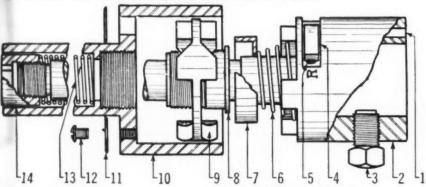
By substituting a shorter clutch ring retaining nut this tool can be readily changed for cutting extra short threads.

For Prices and Dimensions see Pages 292 and 294.

PRINCIPAL DIMENSIONS OF TAP AND DIE HOLDERS



Dimensions A. B. G and H can be furnished to other dimensions than those shown, on special order, to suit customer's specifications. Prices on request.



- 1-Reverse Pawl Pin
- 2-Spindle
- 3-Set Screw
- 4-Reverse Pawl
- 5-Reverse Pawl Spring
- 6—Clutch Return Spring
- 7-Clutch Return Washer

- *8-Clutch Ring Retaining Nut
- 9—Clutch Ring Retainin
- 10 Body
- 11-Cover Plate
- 12-Cover Plate Screw
- 13-Shank Spring
- 14-Spindle Nut

* Part No. 8 can be furnished somewhat shorter than regular so as to enable you to cut extra short threads.

PRICES ON PARTS R AND L TAP AND DIE HOLDERS

Part No.	Name of Part	00	1	2	3	4
1	Reverse Pawl Pin	\$ 0.10	\$ 0.15	\$ 0.25	\$ 0.35	\$ 0.50
2	Spindle (C)	12.00	14.00	21.00	50.00	63.00
3	Set Screw	.35	.45	.60	.60	.60
4	Reverse Pawl	.60	.70	.85	1.15	1.40
5	Reverse Pawl Spring	.10	.10	.10	.15	.15
6	Clutch Return Spring	.20	.30	.35	.65	.90
7	Clutch Return Washer	.30	.45	.60	.85	1.10
8	Clutch Ring Retaining Nut	.90	1.05	1.25	1.70	2.10
9	Clutch Ring (A)	5.00	7.00	10.50	19.00	24.50
10	Body (B)	12.00	14.00	21.00	50.00	63.0
11	Cover Plate	.35	.50	.65	.90	1.20
12	Cover Plate Screw	.10	.10	.10	.10	.10
13	Shank Spring	.20	.30	.35	.65	.9
14	Spindle Nut	.30	.35	.45	.70	1.0
15	Hex Wrenches	.50	.50	.50	.50	.50

R AND L ADAPTERS FOR ACORN DIES AND BUTTON DIES

Size of Tap		S	ize of Acorn Di	corn Dies				
Holder	No. 1	No. 2	No. 3	No. 4	No. 5			
No. 00	\$17.50	\$20.50						
No. 1	\$17.50	\$20.50	\$25.00	\$35.00				
No. 2		\$20.50	\$25.00	\$35.00	\$56.00			
No. 3			\$25.00	\$35.00	\$56.00			
No. 4				\$35.00	\$56.00			

Button Die Adapters for 13/16" or 1" diameter dies to fit No. 00, No. 1 or No. 2
Tap Holder \$20.50

Button Die Adapters for 1-5/16" or 1½" diameter dies to fit No. 1, No. 2, No. 3
or No. 4 Tap Holders \$26.00

Larger sizes, prices on application

Button Die Adapters for 2" diameter dies

LENGTHS OF PULL OUT FOR RELEASING ON REGULAR R AND L TAP AND DIE HOLDERS AND ALSO LENGTHS FOR SHORT THREADS

SIZE	REGULAR	SHORT
No. 000	1/8 of an inch	.100
No. 00	1/8 of an inch	.100
No. 1	5/32 of an inch	.115
No. 2	7/32 of an inch	.156
No. 3	1/4 of an inch	.167
No. 4	5/16 of an inch	.203

R AND L UNIVERSAL TOOL POST

The R and L Universal Tool Post for holding square or flat tools provides means for adjusting the tool IN ALL DIRECTIONS.

It can be used on front or back crossslide with spindle running either forward or backward.

The tool can be set up close to the chuck.

Prices on R and L Universal Tool Posts:

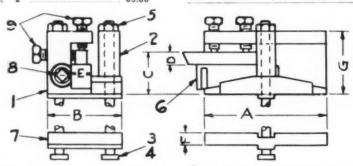
No.	00	 \$35.00
No.	1	 50.00
NI -	2	05.00



Patented.

PRICES ON PARTS FOR R AND L UNIVERSAL TOOL POSTS

Part No.		No. 00	No. 1	No. 2
1	Body	\$25.00	\$35.00	\$45.00
2	Bushing	.45	.50	.60
3	2 Long Bolts (2)	1.25	2.00	2.30
4	2 Short Bolts (2)	.90	1.75	2.10
5	4 Nuts (4)	.20	.30	.35
6	Taper Wedge	4.50	4.75	5.00
7	Raising Block	5.00	6.50	7.00
8	Adjusting Screws	.70	1.00	1.25
9	4 Set Screws (4)	.35	.45	.65



Tool Post No.	A	В	С	D	E	F	G			Re	ema	rks	
00	3"	1-13/16"	1"	3/0"	1/2"	3/8"	1-1/2"	For	No.	00	B. 6	S.	Machine
1	4"	2-13/32"	1-5/16"	1/2"	3/4"	1/2"	1-27/32	00	No.	0	-		**
2	4-1/2"	3"	1-7/16"	5/8"	1"	5/8"	2-3/32"	00	No.	2			**

R AND L CUT OFF BLADE HOLDERS

This tool is designed to fit in our R and L Universal Tool Post for holding Bevelled Cut Off Blades. It enables the operator to remove the entire holder from the Tool Post for regrinding the Cut Off Blade and put it back with the cutting point projecting the same as the original setting, and then place the holder in the Universal Tool Post ready for work without any further adjustment.

These holders can be set to cut off work as close to chuck as desired.

One holder can be used on either front or back cross slide with spind!e running forward. Another one is required if spindle is to run backward.



R AND L FLOATING DRILL HOLDERS

For	holding	Drills	-Reamer	or other	tools
No.	00- 5/8	dia.	shank	S12.00	each
No.	1- 3/4	dia.	shank	13.75	each
No.	2-1"	dia.	shank	15.50	each

Larger Sizes Made to Order



PRICES

- No. 00 Size for Brown and Sharpe No. 00 or 00G......\$20.00 each
- No. 1 Size for Brown and Sharpe No. 0 or 0G 28.00 each

HIGH SPEED CUT OFF BLADES

No.	00-1/2"	wide			52.25	each
No.	1-9"	wide			2.50	each
No.	2-5/8"	wide	********		3.00	each
110	wide for	Brow	n and	Sharpe		
V	ertical SI	ide			3.25	each

Other Sizes to Order

STATE THICKNESS DESIRED

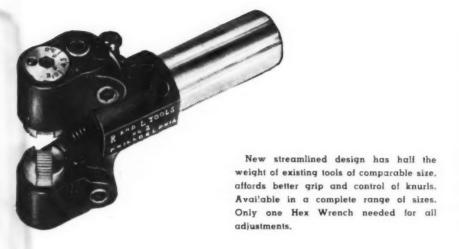
Solid Tungsten Carbide Blades can be furnished—Price given on request.

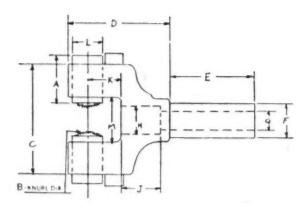


R AND L REVOLVING STOCK STOPS

R AND L

KNURLING TOOL





R AND L KNURL HOLDERS

Price	Capacity Diameter Inches	Knurling Length Inches	Dia. of Shank Inches	No.
\$52.50	1 to 7	1	5 8	00
56.25	1's to 1'	112	3 4	1
60.00	1 8 to 1 6	1 7 s	1	2
75.00	1 ₂ to 1,3	17a	1 or 114	3
75.00	11s to 17s	218	1 or 114	3A

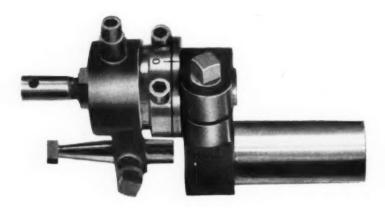
PRICES ON PARTS R and L KNURLING TOOL

Part No.	Name of Part	No. 00	No. 1	No. 2	No. 3	No. 3A
1	Body	\$30.00	\$32.50	\$35.00	\$40.25	\$40.25
2	Barrels (2) ea.	3.50	3.50	3.50	3.50	3.50
3	Knurls (2) ea	2.50	2.50	2.50	2.50	2.50
4	Knurl Pins (2) ea.	.30	.35	.35	.35	.35
5	Barrel Screws (2) ea	.20	.20	.20	.20	.20
6	Adjusting Screws (2) ea.	.70	1.00	1.25	1.85	1.85
7	Clamp Screws (2) ea,	.90	.90	.90	.90	.90

Tool No.	Dia. Will Knurl	A	В	С	D	E	F	G	н	J	K	L	M
00	1 to 3 8	Std.	1/2	115	1-21/32	11/8	5/8	5 16	1/2	9 1 6	15/32	9 1 6	5/8
1	1 a to 1	Std.	5/8	2-15/32	214	1 7/8	3/4	7 1 G	5/8	7/8	3/4	1 1 1 6	1
2	1 s to 7 s	Std. 1 5 1 1	5 8	3 ⁵	2 1	2 3	1	5/8	1	11/4	23/32	11	13/6
3	34 to 112	Std.	5 2	3 (8	210	31/4	114	3/4	11/4	11/4	15	11	2

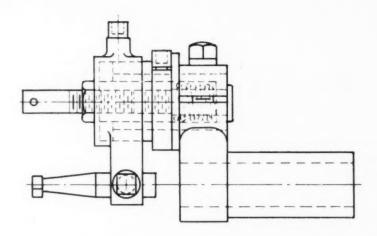
Dimension F can be furnished in other diameters if required.

R AND L RECESSING TOOL



This is an entirely new design. Can be adjusted to operate on any internal diameter within capacity of the machine. It can also be adjusted to operate on outside diameters for cutting grooves or similar operations such as chamfering or cutting clearance at end of threads.

This tool is also easily adjusted to operate with spindle running either right or left handed with pressure on cutter downward giving steadier action on cutting tool.



Approximate Dimensions

Size	Length of Shank	Diameter of Shank	Length of Body	Price
No. 00	13%"	56"	11/4"	\$75.00
No. 1	17/6"	3/4"	13/4"	\$85.00
No. 2	2"	1"	23/4"	\$95.00

Larger sizes made to crder.

Two adjusting screws shown provide for fine adjustment for depth or diameter of recess.

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R and L TOOLS

1825 BRISTOL ST.

PHILADELPHIA 40, PA.

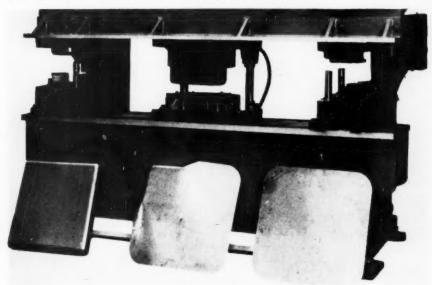
Streamline production of drawn panels, with Verson press brake tool-up

Drawn covers and panels are being produced without expensive press equipment and dies by means of a Verson Allsteel press tool-up prepared for a customer who manufactures cabinets, furnaces, blowers and allied heating equipment.

The old method was said to produce a panel of inferior appearance, even with the use of ball corner inserts. The high production costs stemmed from the great amount of handling required between operations, and the corner welding and finishing required.

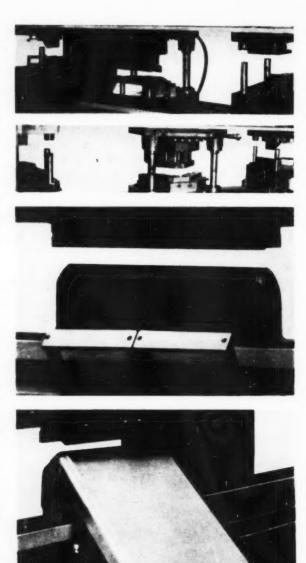
The smallest of 11 different size panels was 21 7/8" by 21 7/8" and the largest was 44 7/8" by 65 7/8". The dies are designed so that a variety of panel sizes can be produced. In the first three operations, the same dies are used without alteration for all sizes.

1. This brake is shown with a tool-up consisting of three sets of dies for drawing and trimming ball corners. The parts produced in this set-up are furnace and blower tops. On the right is the first die which trims developed corners on a square sheared blank in four strokes. Next, the corners are drawn in the draw die which is mounted in the center of the bed over a pneumatic die cushion. After drawing, the surplus material is removed from the corners by means of the cam trim die at the left. A finished part can be seen at the lower left. The sequence of operations is completed by forming the sides in a restrike die in a Verson No. 208 press brake, (figure 5).



- 2. Close up which shows the tooling used in drawing and trimming ball corners. Using a square sheared blank the operations proceed from right to left as follows: 1. Trim developed corners. 2. Draw corners. 3. Cam trim surplus stock after draw.
- 3. Rear view of ball corner draw tool-up showing the drawing die. This die is equipped with pneumatic blankholder and is mounted over a standard Verson Type 2W-10-2 pneumatic die cushion.
- 4. A sectional restrike die Is shown mounted in this press brake. After the ball corners have been drawn and trimmed, the side flange between ball corners is formed in this die in four strokes. An unlimited number of sizes can be worked in this die due to its sectional construction. It is basically a set of master ends which can be expanded any desired distance by placing filler blocks in between.
- 5. A close-up showing part resting in the restrike die after the final radius forming and striking operation. A gauge is mounted on the front of the bed to support the piece in proper position throughout the stroke.

The End



MODERN TOOLS

When pounds will save tons

by A. L. Phillips,

Eutectic Welding Alloys Corp.

When this 1923 Hilles and Jones 70 ton press developed a crack in an old weld close to the base, the machine was inoperative until repaired. It was used for punching 1-in. diameter holes through inch plate, and for shearing 3/4-in. plate.

The repair had to be done "cold" because facilities were not available for preheating a machine of this size. It was decided, therefore, to remove the faulty weld with the new oxygenless

1. The defective weld removed. The heat is so localized that the hand may be placed upon the casting without discomfort in the immediate vicinity of the vee area. The gauge made by this means is a little larger than the diameter of the electrode, which is held almost horizontal to the work in order to avoid digging into the casting. If wider grooves are desired another cut is made adjoining the first groove. In this way they may be made of any depth or width desired. This method eliminates the delay in bringing equipment to the scene

of the repair. A simple change of electrodes permits a welder to remove unwanted metal, and immediately afterwards to rechamfering electrode, trade named ChamferTrode, and to weld the casting with EutecTrode 24X.

ChamferTrode was chosen for two reasons:

- It removed the chill from the casting and brought it to a comfortable handheat.
- 2. The speed with which it operated prevented a local buildup of heat, and unwanted metal was removed at incredible speed. This saved the laborious



sume welding.



2. The partly finished weld. The technique of skip welding was used as illustrated. Beads of an inch in length were deposited in the center of the veed section, and the next deposit was made at another point in the casting to give the first deposit a chance to cool.

By "skipping" from one place to another it was possible to keep the work moving along at a good speed while minimizing the danger of overheating. The arc was directed at all times upon the deposited metal and beads were peened to relieve residual stresses.

and time-consuming chipping operation and left a clean bright groove which was an ideal base for welding.

EutecTrode 24X was selected for its high affinity for east iron. The higher the affinity an alloy has for the metal it is to join, the better and stronger will be the bond at the interface, the ease of application will be greater and a strong homogeneous weld will result.

The low watt input keeps the heat to a minimum and deposits can be made without bringing the parent metal to a critical heat. This minimizes the danger of cracking, distortion, and embrittlement.

In this particular case, EutecTrode 27 was used for the first pass because of the nature of the metal. It was oil impregnated through years of service and as this electrode is formulated to



3. The completed weld. This repair was made possible by the latest advances in applied metallurgy combined with the new alloys and techniques. It would have been utterly impossible to repair this press "cold" by conventional methods, and the time and equipment involved would have caused a lengthy stoppage.

give an excellent bond to metal, however dirty, it was considered best to use it for the initial passes so that an adequate base could be formed for this buildup to follow.

The repair was made in quick time the casting remained at a comfortable hand-heat throughout; no lengthy preheating and post heating cycle was necessary, and a high strength, non-porous bond was obtained.

Toggle clamps aid production of C-119 "flying boxcars" at Kaiser-Frazer

De-STA-Co Toggle clamps are being utilized on the build-up fixtures for the Fairchild C-119 rear panel in the Kaiser-Frazer plant at Willow Run, Mich. Clamps are used to give positive holding action on the horizontal stringers, vertical frames and the beams



MACHINE TOOLS





Exclusive



Manufactured by Leading

Distribution

No Priority Required Prompt Delivery



morande 55" Vertical Boring Mill, Medel TVK120, with Three Heads, and 61" Swing with Side Head Below Table Top. 55" Vertical



GU Model RU-1000 Universal Cylindrical Grinder, 12"x40".



No. 4 Di Palo dial type

Hydraulic Surface Grinders, Zocca. Up to 72". Available with Interchangeable Heads, Horizontal and Vertical, and Spline Grinding Attachments, if desired.



Caser Radial Drills-6'. 7'. 3', 4', and 10'.



Saddle and Ram Nos. 4, IA, 2A. Types. Fully Equipped.



21/2". 3". 33/4".

Polygon grinder, exceptionally versatile machine. Universal cylindrical, external, internal. elliptical triangular & square arinding.



Horizontal Boring Mills-21/2". 3". 33/4". 4" 5"

AMI-600 Borematic, horizontal hydraulic boring machine, with single or opposed spindle and mul-tiple spindles to suit.



Minganti Jig Borer, medel FAV500C, precision vertical milling and boring machine, with built-in 25½" rotary table. Overall size rectangular table: 30"x61"

The above and many other types of ma-chine tools on display under power at our showrooms.

Also, Always on hand extensive stock Used & Rebuilt Production and Toolroom Machines of wide range of sizes and capacities.

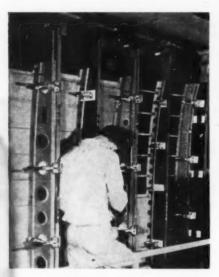
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ALL EQUIPMENT FOR SALE OR RENT LIBERAL CREDIT ARRANGEMENTS . UP TO 3 YEARS YOUR USED MACHINERY ACCEPTABLE IN TRADE-IN



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HYacinth 2-7400



Toggle clamps being used on the build-up factures for the Fairchild C-119 rear side panel. Clamps are used to give positive holding action on the horizontal stringers, vertical frames and the beams between the frames during the riveting operations.

between the frames during the riveting operations.

When the stringers, frames and beams are fastened together the skin is positioned on the frame and rivet holes are drilled to size. The second step is to prepare the skin for riveting. It is taken off the frames, placed on a crimping machine, crimped, and has an aircraft finishing seal applied. After these operations the skin is repositioned on the frames and riveted in place.

Toggle clamps are also utilized on the Mono Rail drill jig. Forty-three clamps are used to hold the rail in position during the drilling operation. An air feed drill with automatic regulator drills one-quarter inch trolly stop locators in the rail. The mono rail is used in the aerial delivery system of the Fairchild C-119 "Flying Boxcars," the cargo-personnel planes which proved so effective in delivering para-



Forty-three clamps are used to hold the rail in position during drilling operation.

troopers and material to critical areas on the Korean front.

The De-STA-Co Toggle Clamps are manufactured by the Detroit Stamping Co., 350 Midland Ave., Detroit 3, Mich.

Gun tube turning time slashed 50% with clamped carbide tools

Doubled production of 105 millimeter gun tubes at a midwestern ordnance plant was recently achieved by replacing conventional brazed carbide tools with standard, cemented tungsten carbide clamped tools produced by Kennametal, Inc. of Latrobe, Penn. By minimizing tool changing down time and eliminating one roughing cut, production time per tube was slashed from 3.6 hours to 1.8 hours, a 50 per cent reduction.

Original tools used on this job consisted of a variety of carbide grades and shank sizes which were on hand when the gun contract was obtained. To turn these tough chrome-nickel forgings (Brinell 350-385) at 75 revolutions per minute and a 0.023-inch feed required two roughing cuts, a semi-finishing cut and a finishing cut, a total of four operations on a LeBlond tracer lathe. Depth of cut on the first pass varied from 1/4 to 5/8-inch. This variation in depth plus relatively long cuts resulted in



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Month after month of steady, rigorous high speed production tapping is taken in stride with versatile Procunier Tappers. Built to rigid standards of accuracy and dependability, they provide longer hours of efficient tapping, with fewer costly shutdowns, less parts spoilage and a big reduction in tap breakage. These combined advantages enable operators to increase their capacity to handle bigger production jobs with greater ease, accuracy and speed. Only Procunier tapping attachments offer faster, smoother action, longer life, less wear and vibration with a minimum of maintenance.

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- Tap breakage is practically eliminated due to the high sensitivity of the new cork-faced friction clutch which automatically regulates the driving pressure.
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- Tap wabble is eliminated because chuck spindle is supported at both ends.
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 PLUS MANY OTHER EXCLUSIVE FEATURES.

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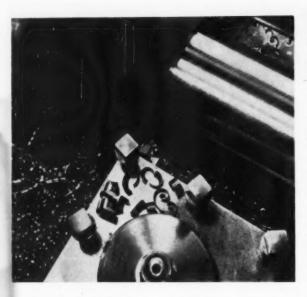
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Safety Chuck Company 14 S. CLINTON ST. CHICAGO 6, ILL.

Ť	4	New Tru-Grip
7	4	Tap Holder

The exclusive Procunier "Tru-Grip" tap holder is lighter, smaller in diameter. It affords easier tapping close to walls or shoulders, eliminates "'chewed" tap shanks. Holds tap true.

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	Name							



Rough turning 105 mm. gun tube on LeBlond tracer lathe with Kennametal style BRH-88 clamped tool, grade K2S, at 75 RPM, 185 SFM (max.), and .027" feed. Depth of cut on first pass varied from ¼" to %" because of roughness of the chrome-nickel forging (350-385 Brinell). Finish turning done with style GRH-S5 clamped tool at 90 RPM, 210 SFM (max.), .027" feed, and 1/16" depth of cut.

Production with previouslyused brazed tools was 2½ pieces in 9 hours. Four cuts were required and considerable tool breakage was experienced. Clamped tool turns 5 pieces in 9 hours to reduce time per piece from 3.6 hours to 1.8 hours or 50%.

considerable tool breakage and toolchanging down time.

Rough turning is now done at the plant with a clamped carbide tool using the same speed but a slightly higher feed of 0.027-inch. Since clamped tools are free from any brazing strains, down time due to tool breakage has been practically eliminated. Furthermore, it is now possible to completely turn the

gun tubes with only three cuts.

Finish turning is also done with Kennametal clamped carbide tools at 90 revolutions per minute, 130 to 210 surface feet per minute with 1/16-inch depth of cut.

Production with the brazed tools was two and one-half pieces in nine hours. Now, with clamped carbide tools five pieces are easily turned in nine hours.

New method of producing tapered aircraft skins

A COMPLETELY new method of tapering aircraft skins through the use of abrasive belts offers the possibility to production men of lower costs, better finishes, lower capital investment and a considerably improved rate of production. The joint announcement by The Carborundum Co., Niagara Falls N. Y., and the Bell Aircraft Corp., Buffalo, N. Y., offers a solution to harried production men for a problem which has long plagued them in direct ratio to the constant demands by aircraft designers for lighter and more intricate wing and tail sections.

Another benefit in the picture is the fact that preliminary design of aircraft has been restricted somewhat due to the lack of sufficiently economical production methods for tapering skins. The new method also may be an answer to the fear of many expert wing specialists who state freely that present methods could not hope to cope with actual anticipated wartime requirements.

The process involves the use of a wide belt machine to which certain modifications have been made. Using a wide abrasive belt in conjunction with a "61" rubber-faced contact roll



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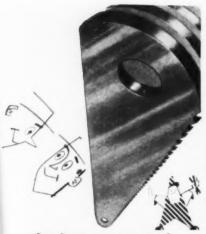
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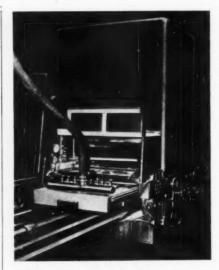
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CLEMSON BROS., Inc.

Makers of Hand and Power Hack Saw Blades, Frames, Metal Cutting Band Saw Blades and Clemson Lawn Machines



Modified wide-belt abrasive machine used in The Carborundum Company's new method of producing aircraft skins. Tests to date indicate much faster production rates at considerably lower costs, (Abrasive belt has been removed to show rubberfaced contact roll.)

by Carborundum, cuts up to one-tenth inch in depth can be taken over the entire width of aluminum sheets up to 72 inches wide. Moreover, the equally important subsequent operation of polishing the aluminum sections can be handled on the same machine through a simple change of the abrasive belt to a finer grit belt, thus further reducing over-all production time.

Carborundum's new process, tested thoroughly with the help of Bell production men, showed that varying tapers can be generated easily with this abrasive belt method and that finished skins can be produced at a considerably faster rate than heretofore. The secret of the faster stock removal rate, of course, lies in the millions of cutting edges in the form of abrasive grains being presented to the entire width and surface of the sheet, whereas mill fly cutters, for instance, can operate on only a twelve to fourteen-inch (maxi-

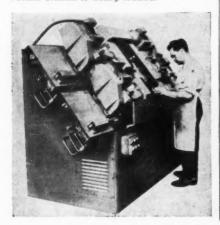
mum 24" to 28" using two heads) section of the sheet at one time.

With the abrasive belt method, tolerances are achieved of plus or minus .005 inches. These tolerances are easily realized and can probably be bettered. Micro finishes as low as ten R.M.S. are achieved with the fine grit belts, whereas present methods leave a microscopic step condition which must be polished out by hand. The new abrasive belt method keeps the work temperature below 100° F., hence no metallurgical changes take place in the material. Perhaps most important of all, under actual test conditions, abrasive costs were found to be from twelve to fifteen cents per pound of aluminum removed -considerably lower than known costs for present methods.

High-production boring machine for wrist pin holes

This new model 355 Heald Bore-Matic borizes wrist pin holes in pistons at the rate of 700 parts per hour. Operation consists of semi-finishing bores, finish grooving and chamfering.

Working area of this special model 355 Bore-Matic is slanted or sloped back and up at a 40° anale for ease in loading and unloading. Machine cycle is extremely fast; pistons are semi-finish bored, chamfered and grooved. Top station is boring while bottom station is being loaded.





THEY GRIND—NOT JUST RUB!

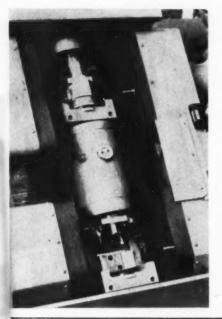
The RPM's stay up while grinding . . . not only when the grinder runs idle.

It is an established fact that surface speeds must stay up to approximately a mile a minute if you want to grind...not just rub. Every mechanic knows this, but an inexperienced buyer may order tools that maintain proper grinding speeds only when running idle. The speed of Kipp air grinders drops but slightly when put to work. That means better work . . . longer wheel life.

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Write for KIPP Air Tool Catalog at 3006



Fast clamping fixtures, automatically operated, located on the O.D., dome end, and O.D. of rough wrist pin bosses on the inside of the piston.

Basically, the machine consists of four special hydraulic cross slides mounted on a fabricated base with a two-station hydraulically operated fixture positioned between the slides. A boringhead and related drive equipment are mounted on each slide.

The angle (40°) of the slides to the base provides ease and speed of loading and operation.

While the rear opposing slides are borizing one piston, the front slides are at rest for unloading and loading. After piston is positioned in front station, "memory" button is operated which, following completion of borizing on rear station, automatically clamps parts and starts second half cycle.

Boringheads run continously and the coolant for each station, which is piped through the clamping ram into the



piston, shuts off automatically as the cross slides for each station reach the rest position.

Part is hydraulically clamped using the O.D., dome end, and the O.D. of rough wrist pin bosses on the inside of the piston.

New hardening treatment increases life of staple header die 40 times

Hard-N-Tuff Steel Hardening Compound is being used by a large eastern railroad to harden staple header dies made from AISI 1050 steel with the following results: The dies, which before hardening had begun to mushroom after ten (10) impressions, are now, after hardening, giving 400 satisfactory impressions.

The compound is quick, safe, and easy to use. It requires no special equipment. You just heat the part, roll it in the powder, reheat and quench. It is also perfectly suited for use in pack hardening. It is recommended for all case hardening jobs, whether in production, in maintenance of tools and parts, or



in emergency on-the-job hardening. It is being used to harden dies, punches, gears, levers, chisels, drill bits, bushings, etc., and is guaranteed to increase tool and part life at least 300%.

Made by Doughty Laboratories, Inc., 500 Fifth Ave., New York 36, N. Y.

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Specially designed teeth clear away chips for speedier—cooler—precise cutting. Atlantic Wavy Set Bands have precision milled, even set teeth that slice through multiple drill rods, bar stock, I beams or tubing for gong cutting efficiency.

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Shop HINTS



Aid for center loading

by Jordan Perivale

LOADING long shafts between lathe or grinder centers is usually a two-handed job for which the machine operator has to request assistance from another person.

A grinder or lathe operator can usually manage a short shaft single-handed. He engages the headstock center with the hole in the work and holds it there by pushing the component axially while he engages the tailstock center. Sometimes, the component is just too long or heavy for the operator to control by himself with the result that the headstock center becomes disengaged and the component is dropped onto the machine with probable damage to both.

In order to eliminate the need for a helper and to avoid damage to work and machine, a support for the loading of work between machine centers was designed and made and very good results were obtained by its use. The purpose of the support is to hold the work in contact with the headstock center of the machine while the operator concentrates his energy and attention on the tailstock center.

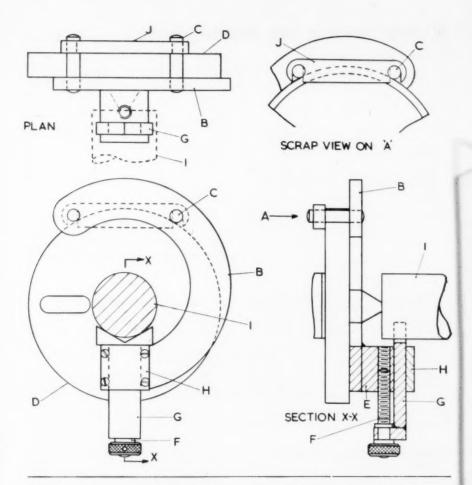
The support comprises a C-shaped piece of flat steel **B** at the upper end of which are a pair of supporting pins C. The peripheries of the pins make contact with the outside diameter of the work driver plate **D** and serve the dual

purposes supporting the weight of the C-shaped piece and centralizing the bottom end of the piece.

At the lower end of the C-shaped piece is welded a block E which is drilled and tapped to accommodate the elevating screw F which raises or lowers the V-plate G. The V-plate is made from a piece of flat steel and slides vertically in a slot milled in the block E where it is retained in place by means of the keep plate H. By rotating the elevating screw, the V-plate is adjusted vertically to suit various work diameters I and align them with the machine centers. As illustrated, the Vplate is in its lowest position for accommodating the largest work diameter to be done on this particular machine.

To prevent the C-shaped piece from falling away from the machine's work-driver plate, a simple locking plate J is provided. The slots in this locking plate engage with a flat filed into the periphery of each supporting pin C so that the locking plate is simply dropped into place on the pins. The locking plate is in contact with the back edge of the work piece driver plate, as shown in the scrap view A.

In use, the work supporter is placed on the work driver plate and the Vplate is set to the correct height. The height setting need not be made with



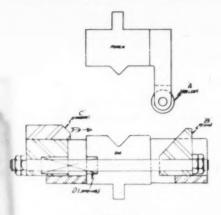
any great accuracy as the centers will engage themselves provided that the V-plate is set so that the center hole is a fraction below the machine center line. The operator places the left hand end of the component in the V where-upon it is a simple matter for him to support the right hand end with one hand while he operates the tailstock center with the other.

Before grinding or turning can commence, the work supporter must be detached. This is done by lifting up the locking plate out of engagement with the supporting pins when the work support may be removed from the machine very easily.

It is usual practice with our operators to slide the work-driving dog on to the component before mounting in the machine. After the work is on the centers and the support has been removed, the driving dog can be adjusted for position and locked to the work. The support is also used for unloading the work, in which case, it is already in position for loading the next piece.

317

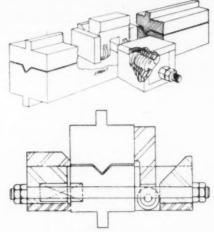
Safety feeder for brake dies



LOADING POSITION

From the Oliver Corp., Battle Creek, Mich., comes this interesting suggestion for increasing safety of press brakes.

With the die in open position stock is dropped onto die-back gages which prevent it from being positioned too far back. The ram descends and roller A contacts cam B and moves loader C in the direction of the arrow. At the same instant the stock is brought to bear



POSITION-LOADER

against the back gages, the roller A drops over the cam rise and the forward motion of the loader C ceases. The ram then continues down and the part is formed.

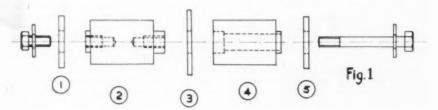
On the up stroke of the ram, roller A is disengaged from cam B and spring D returns loader C to the load position.

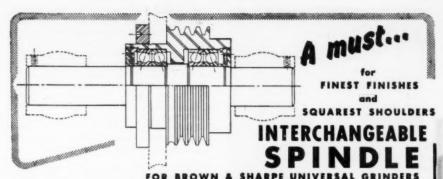
Combination gage made of "building blocks"

by H. G. Frommer

A work piece having a recess within a shoulder-bore had been designed with close tolerances as to width of recess

and distance between front surface of recess and shoulder of bore. Since only a limited number of pieces was involved, the tooling budget was low. To stay within this budget, we decided to combine both gages into one "package": Parts 1, 3, and 5 are steel disks.





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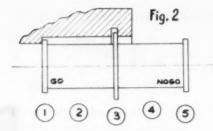
Magni-Focuser—the binocular magnifier—reduces eye-strain and prevents squinting—thereby speeding production, increasing accuracy and minimizing the chance of errors and accidents.

Gauge reading, layout work, inspection, tool and die work are just a few of the jobs that need the Magni-Focuser. Speeds precision assemblies, blue print work. Restores the usefulness of the skilled hands of many older workers whose vision needs a seeing aid.

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bored, turned and surface ground to exact thicknesses. Disk 1 was made to the low limit of the recess width, while number 5 disk's thickness equalled the high limit. Disk 3 was smaller than both to permit an easy entry. Part 2 is a piece of round stock, turned on both ends to a slip fit with the disk bores, and drilled and tapped for cap screws. Part 4, similarly to part 2, has such turned shoulder on one end only, while the other end is counterbored for the shoulder turn of part 2. All parts are interlocked and fastened with two cap screws and their washers. Figure 2, which shows the assembled gage within the work piece, pictures the depth checking operation in "GO" position. The other end of the gage serves as a "NOGO" gage. Disks 1 and 5 are then used as "GO" and "NOGO" gages for checking the width of the recess.

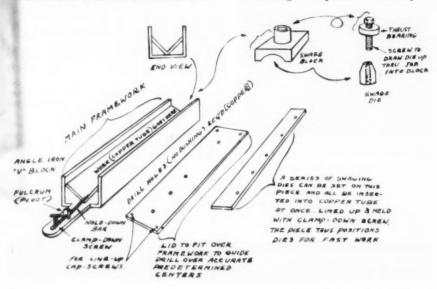
Making gages of several component parts permits inexpensive replacement of worn parts. Moreover, these gages can be modified easily when engineering changes require different dimensions or tolerances of the work piece.

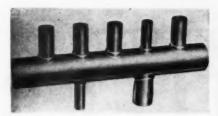
Tool for fabricating extruded copper manifolds

by Geo. F. Burnley

Often, when working on pressure vessels of various types, the situation arises when several leads are needed to connect with the entry or outlet. While castings may be made, or pipe fittings connected to cope with the situation, both methods are somewhat clumsy and expensive besides possessing the tendency to leak at threaded joints.

On facing this problem the Capitol





Machine Works of Oakland, Cal., experimented with various unique tools and came up with the following solution.

Procuring a series of copper tubes of suitable length and diameter, a jig was made to hold these for the purpose of drilling and extruding the holes to the proper shape and size to braze in manifold leads. The jig, as shown herewith, was simply a long piece of deep channel iron with a section of angle iron welded within as a "V" block. With a piece of copper tubing placed inside and clamped down, the lid is properly aligned over the jig and pilot holes drilled. Next, the lid is removed and the holes enlarged to the required size. After this, a nicely fitted swage block or yoke is slid over the tubing holes and, one by one, the various swage dies are drawn off a strap-iron rack placed inside, to thus enlarge the holes to the desired shape and dimension.

Lip rest life increased from two days to six weeks

A carbide-tipped lip rest for Oliver face mill grinders used to grind carbide mill cutters at Texas Eng. and Mfg. Co., Inc., Dallas, Tex., has increased lip rest life from approximately two



days to more than six weeks, yet cost of the new type lip rest is no more than that of the heat treated steel lip rests previously used.

The new type rest was designed by C. R. Croxton, a grinder operator, who felt that there must be some solution to the problem of lip rests being eaten up in no time at all by the carbide spar mill cutters he was grinding. He took a piece of steel strap 3/32 x 3/8 x 21/4 inches, heated it, and bent in an offset. He then silver soldered a worn carbide cutter destined for the scrap heap to this strip, and ground the cutter to the desired shape on a diamond. The new lip rest was then drilled and tapped and attached to the grinder. It has been in service for nearly six weeks and is still going strong.

Croxton's principle is adaptable to lip rests for other types of grinders and he has already made up a carbide tipped rest for a Cincinnati tool and grinder also used to grind carbide cutters.

American Built Machine Tools, Volume 1

The first volume of American Built Machine Tools is now ready for distribution. This volume contains the first 16 special reports which appeared in the BLUE BOOK during the last two years.

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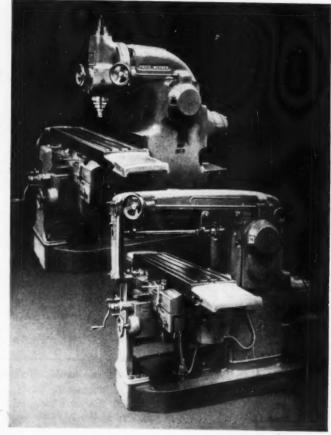
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No. 3 Vertical No. 3 Plain

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34th National Metal Congress and Exposition Philadelphia, Oct. 18-24

The 34th National Metal Congress and Exposition will meet Oct. 18-24 at the Philadelphia, Pa., convention halls.

Technical meetings will include: American Society for Metals, Hotel Benjamin Franklin; American Welding Society, Bellevue-Stratford Hotel; Institute of Metals Division, American Institute of Mining and Metallurgical Engineers, Hotel Adelphia; Society for Non-Destructive Testing, Hotel Sylvania; National Metal Exposition, Philadelphia Convention Halls.

The event is sponsored by the American Society for Metals, American Welding Society, Institute of Metals Division, American Institute of Mining and Metallurgical Engineers, and Society for Non-Destructive Testing.

Over 400 nationally-known firms engaged in either the production of metals, the treatment of metals, the fabrication of metals into component parts or products; or in rendering services to all of these, will exhibit.

210,000 square feet of floor space, nearly five acres, will be utilized by the exhibitors for the display and demonstration of their products, equipment or services. In addition, thousands of square feet of space has been set aside for special meetings, forums, lectures

and other activities connected with the congress and the exposition.

The American Society for Metals will hold its annual seminar on Saturday morning and afternoon, and Sunday morning and afternoon, Oct. 18-19. Subject of the 1952 ASM Seminar is "Modern Research Techniques in Physical Metallurgy."

Throughout the week of the Metal Congress, the American Society for Metals and the American Welding Society will hold morning, afternoon and evening technical meetings. The Institute of Metals Division, AIME, will hold daily and evening technical sessions Monday through Wednesday. The Society for Non-Destructive Testing will hold sessions during four days of the week.

Exhibitors and booth numbers

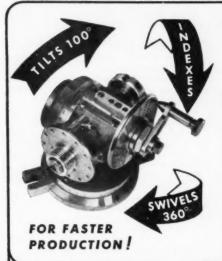
A.B.C. Die Casting Mach. Co., Chicago, Ill. 1563

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Acme Steel Co., Acme Steel Prods. Div.. Chicago, Ill. 1977 Air Products, Inc. 1662

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Ajax Electric Co., Inc., Philadelphia, Pa. 624	American Optical Co., Instrument Div., Buffalo, N. Y. 442
Ajax Electrothermic Corp., Trenton, N. J. 624	The American Platinum Works, Newark, N. J.
Ajax Engineering Corp., Trenton, N. J. 524	American Pullmax Co., Inc., Chicago, Ill. 1449
Ajusto Equipment Co., Toledo, Ohio 1376	American Silver Co., Inc., Flushing, N. Y.
Allegheny Ludium Steel Corp., Bracken- ridge, Pa. 141	709 American Society for Metals, Philadelphia
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Allison Company, Bridgeport, Conn. 1409 Alloy Engrg, & Casting Co., Champaign, Ill. 507	Mishawaka, Ind. 1749 Ampco Metals, Inc., Milwaukee, Wisc. 1217
Alloy Metal Wire Co., Inc., Prospect Park	Amplex Mfg. Co., Subs. of Chrysler Corp.,
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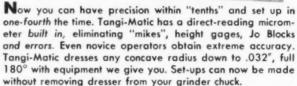
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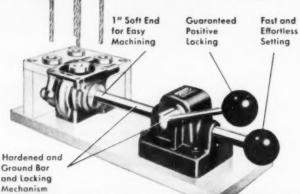
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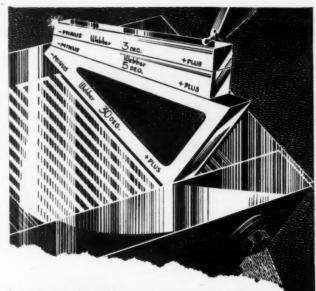
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Torit Manufacturing Co., St. Paul. Minn. 1881
Turco Products, Inc., Los Angeles, Calif.
1028
Tyler Mig., Co. 1280
Uddeholm Company, New York, N.Y.
The IIIdella Com Danie Mila
The Udylite Corp., Detroit, Mich. 216
Union Carbide & Carbon Corp., Haynes
Stellite Div., Kokomo, Ind. 1202
Union Carbide & Carbon Corp., New York.
N. Y. 1202
U. S. Electrical Motors, Inc., Los Angeles, Calif. 760
U. S. Pipe & Foundry Co., Special Products
Div., Burlington, N. J. 702
U. S. Plywood Corp., New York, N. Y.
1282
Upton Electric Furnace Co., Detroit, Mich.
1519
Vanadium Corp. of America, New York, N. Y. 618
Vapofier Corporation, Chicago, Ill. 1953
Versa-Mil Co., New York, N. Y. 741
Waldes Kohinoor, Inc., Long Island City,
N. Y. 1915
Wall Colmonoy Corp., Detroit, Mich.
Walker-Turner Div. 1941
Warner Div. 610
Waukee Engineering Co., Milwaukee, Wisc.
1223
Webber Appliance Co., Inc., Indianapolis,
Ind. 1368
Welders Supply 1380
Weldwire Co., Inc., Philadelphia, Pa.
1383
Wells Manufacturing Co., Three Rivers,
Mich. 1678
Westinghouse Elec. Corp., Pittsburgh, Pa. 1510
Weston Electrical Instrument Corp., Newark,
N. J. 1011
Wheelco Instruments Co., Chicago, Ill, 641
Whitehead Metal Products Co., Inc. New
York, N. Y. 1283
Edwin L. Wiegand Co., Pittsburgh, Pa.
1244
Wilson Mechanical Instrument Div. 706
Williams, Brown & Earle, Inc., Philadelphia,
Pg. 1232

/2



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No complicated set ups, no sine bar, no sine table or variables in method. It takes just a few seconds to add up the figures on the blocks that check his work.



One set of blocks can save controversy, time and expense. The saving on a single inaccurately ground work piece often pays for the set. Write for complete information.

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LARGEST EXCLUSIVE MANUFACTURERS OF GAGE BLOCKS

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Worthington Corporation, Plainfield, N. J. 1720 Worthington Corporation, Harrison, N.J.

Ziess, Carl 920

Col. John Frye, completing a tour of duty in Washington, has been reappointed manager of sales of Columbia Steel & Shafting Co. and its Summerill Tubing Co. Division, Carnegie, Pa., according to an announcement by Tom L. Parker, vice president in charge of sales.

The offices of Norge Heat Division, Borg-Warner Corp., were moved from Detroit to Kalamazoo, Mich. it was announced by C. S. Davis, Jr., its president.

The Norge Heat Division is presently marketing a full line of domestic heating equipment. In addition, however, the company has planned to expand

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It will bring you the complete catalog on Minute Man KEY-WAY BROACH KITS.—show you how you can broach any standard width from 1/16" to 1" in any bore from ½" to 3" by hand IN ONE MINUTE for as little as a penny a keyway. And you'll get a lot of valuable Keyway reference data, too! Mail the Coupon, Now!







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activities in the plumbing and airconditioning field as well.

The following promotions have been announced by the Carpenter Steel Co., Reading, Pa: S. C. Shapleigh has been named branch manager and F. J. Weldon, assistant branch manager in Bridgeport, Conn; F. J. McCarty, assistant branch manager in Hartford, Conn., J. D. Nelson, assistant branch manager in Providence, R. I.; P. W. Holtz, branch manager in Chicago, Ill.

340

and C. W. Windfelder, branch manager in Milwaukee, Wis.

M. Lawrence Price, professor of machine design at Worcester Polytechnic Institute, has been granted a leave of absence to do research for Reed Rolled Thread Die Co. of Holden, Mass. Prof. Price's activities will cover a wide variety of problems involved in the formation of screw threads and special forms by the cold rolling process.

U. S. Electrical Motors. Inc., Los Angeles, has increased their space recently to an additional 40% of shop and office area of the Los Angeles facilities.

Administration headquarters remain at the principal plant in the 200 block on East Slauson Ave. Other buildings have been leased within a radius of one mile to facilitate manufacturing and servicing procedures.



cording to an announcement by R. C. Ingersoll, president of Borg-Warner. With the change of ownership of the company, Indianapolis becomes a key city in the Borg-Warner group of 28 manufacturing plants and specialty steel mills in 23 cities.

More than 1,000 persons normally are employed in the 160,000-squarefoot Atkins plant. The company was founded in 1855.

Borg-Warner acquires Atkins Saw

Acquisition of E. C. Atkins and Co. of Indianapolis, century-old saw manufacturing concern, by Borg-Warner Corp. of Chicago has been disclosed. The company will be operated as the Atkins Division of Borg-Warner, ac-

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Nickel Chrome Steel Pinions & Scroll, Semi-Steel Body, Universal Three Jaw, Two Sets of Jaws, Three Pinion

Model	Size	Weight ibs.	Price
28	2%"	21/2	\$25.00
29	31/4"	31/2	26.50
30	4"	61/2	30.00
30A	5"	113/4	37.50
31	6"	17%	45.00
30BP*	4"	81/4	33.50
30ABP*	5"	15	42.50
31BP*	6"	21	50.00
52	71/2"	29	57.50
53	9"	43	67.50

SELF CENTERING GEARED SCROLL

Universal Four Jaw, Two Sets of Jaws, Two Pinion Model Size Weight Price 3% 30 Y 30 A Y 31 Y 32.50 43.50 52.50 30AYBP* 5" 22

Soft Jaws Available

Models marked with asterisk () are fitted with $1\frac{1}{2}$ -8 Back Plate for all popular 9" and 10" lathes.

LIGHT INDEPENDENT CHUCKS

Nickel Steel Operating Screws, Semi-Steel Body, Four Jaw Reversible, Hard Steel Jaws

Model	Size	Weight lbs.	Price
35A	31/4"	23/4	\$12.50
35B	4"	4	14.00
35C	455"	5	18.50
34	6"	10	22.50
35BP*	4"	61/2	18.00
35CBP*	41/2"	7	22.50
24 D D 1	6"	1.4	26 58

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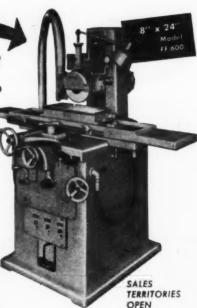
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PARTIAL Max. length of grinding area Max. width of grinding area Long, table speed, infinitely variable FPM Grinding wheel

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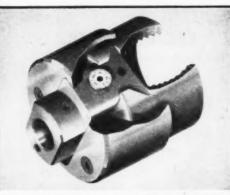
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Handle your pressure, vacuum or suction jobs with much smaller Leiman Air Pumps. Save weight and space — run at lower r.p.m. — have fewer moving parts no springs, gaskets or packing — no tips to renew — nothing to give trouble.

Metal Cleaning and Finishing without acids or scratch brushes

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43 Standard Sizes

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DIES Complete Line of Induction Hardened Dies for All Makes and Sizes of Press Brakes.





Leigh H. Norgren has been appointed Plant Superintendent of the C. A. Nor-



Leigh H. Norgren

Albert E. Del Gado

gren Co., Englewood, Colo.

Mr. Norgren has been working as an industrial engineer in the plant of the pneumatic products manufacturer for about two years.

Albert E. Del Gado, formerly advertising counselor for Shigeta-Wright Co., has been appointed director of sales and advertising and assistant to George Wright, executive general manager. He will supervise and direct all industrial

and commercial sales and advertising activities nationally.

Ispen in new building

Located in a handsome, modern onestory building at 2125 Kishwaukee St., Ipsenlab of Rockford, Ill., is the midwest's newest establishment for the development of new techniques and the testing of the latest methods and equip-



ment for the treatment of metals. Emphasis is placed on the application of various protective gas atmospheres for the treatment of ferrous and non-

The NEW PROSSER Carbide Tool Grinder

The new model AA bench and floor type carbide grinders have power to spare, and even greater ruggedness and freedom from vibration than heretofore. No increase in price!

A full one-half H. P. motor and an extra large shaft are combined with the famous Prosser features:

Quick-acting indexing tables - permits instant and accurate angle setting.

Compensation for wheel wear - permits use of virtually 100% of wheels.

Efficient—with diamond, silicon carbide, or aluminum oxide wheels, for roughing or finishing work on carbide, high speed steel, or stellite.

Wet or dry models.

For detailed information write



THOMAS PROSSER & SON NEW YORK N

ferrous materials. Bright hardening, carburizing, carbo-nitriding, annealing, tempering and controlled oxidation tempering processes are featured.

The Ipsenlab is divided into two sections, the metallurgical laboratory and the shop heat-treating section.

Laboratory instruments and equipment of the newest design are used including Fisher induction carbon apparatus for rapid determination of car-



bon in steel, variable speed polishing heads for the preparation of metallographic specimens, and a Tukon hardness tester for determination of hardness gradients and microscopic observations.

Quality checks are maintained on materials used in the construction of the Ipsen heat treating units.

A small machine shop located in the laboratory contains equipment for the proper preparation of test samples before and after heat treatment. The equipment is also used for the construction of special test apparatus.

The heat treating department of Ipsenlab occupies 4752 square feet of floor space containing the latest Ispen production and experimental metal treating units.

\$30,000 mechanical design award program

A new competition for designers, engineers and manufacturers of machinery of all types has just been announced by The James F. Lincoln Arc Welding Foundation of Cleveland, Ohio. The new \$30,000 mechanical design award program offers 101 cash awards, as well as national recognition, for the best papers describing the mech-



Made of finest high speed steel. Available in all standard sizes. Always in stock for immediate delivery. Specials made to your specifications.





High speed. Right hand 1/2" shank. Diameter from 1/4" to 11/2". Standard sizea in stock for immediate delivery. Complete set —41 sizes—available in sturdy, hardwood box. Saves time and money, because you always have the size you need.



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Precision made of tool steel, hardened and accurately ground. Tapered .0005" to the inch. Mandrels from 8/16" to 1" are .0005" undersize at small end, from 1\(\frac{1}{11}\)" to 3", .001" undersize. Immediate delivery.

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KEO CUTTERS

anical design and construction of any type of machine or machine component which is designed for arc welded steel fabrication.

Any machine or component whose performance or appearance has been improved or whose cost has been reduced through the use of arc welding in its construction can be described.

Jacobs Co. engineer wins merit award

The Franklin Institute of Pennsylvania announces the award of its Certificate of Merit to Arthur M. Stoner, of West Hartford, Conn., for his development of a chuck and collet combination for lathes to hold cylindrical work being machined. Formal presentation of the award will be made at the institute's Medal Day ceremonies in Franklin Hall. Oct. 15.

Mr. Stoner is vice-president in charge of engineering of The Jacobs Mfg. Co. of West Hartford.

This device, known as the "spindle nose lathe collet chuck," has been in commercial use since 1949 and is now widely used on machine tools both in this country and abroad.

Carborundum plant

A new plant for the production of zirconium and hafnium sponge metals is to be built by The Carborundum Metals Co., Inc., a recently formed subsidiary of The Carborundum Company. The plant will be located just outside the village line of Akron, New York, in the Town of Newstead. It will be situated on an 18½ acre plot.

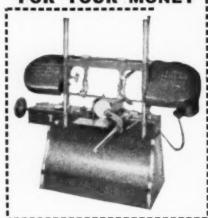
Lincoln Park acquires interest in Standard

Gene DeMambro, president of Lincoln Park Industries, Inc., announces the acquisition by the company of a 51% interest in the Standard Engineering Co., 13535 Seven Mile Road West, Detroit 35, Mich.

Standard Engineering Co. with Ray Dahlstrom as general manager, is staffed with fifty engineers.

George K. Cassady has been appointed assistant general sales manager, Giddings & Lewis Machine Tool Co., Fond du Lac, Wis. He had been assistant to the sales manager.

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- Model M-9 Cap. 9"x18"
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INTERSTATE Machinery Co. Inc.

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Milton F. Beecher, head of Norton Company's research and development laboratories since 1941, retired as vicepresident and director August 31. As chief of these facilities, he will be suc-ceeded by Wallace L. Howe, director





G. T. Cassady

M. F. Beecher

of research and development. Mr. Beecher has been responsible for the guidance and direction of many im-portant inventions and developments of the Worcester, Mass., firm during his 37 years there.

John A. Clark, Jr., has joined Warner and Swasey as controller of the company. Clark comes from Tinnerman





A. M. Naysmith

I. A. Clark, Ir.

Products, Inc., Cleveland, where he

served as controller.

Clyde E. Brown has been named general manager of the H. C. Hook Co., Inc., 135 South St., Auburn, Mass. Mr. Brown was formerly with DeWalt Mach. & Engr. Co. of Worcester, Mass.

Archie M. Naysmith has been appointed general superintendent and plant engineer of Macwhyte Co., Kenosha, Wis. He was formerly plant engineer. He came to Macwhyte Company 24 years ago from Scotland, where he had 12 years of experience in production, laboratory, machine shop, and



OOL COMPANY

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Precision processed of finest high speed tool steel, and scientifically heat treated for long cutting life... Reltool End Mills are famous for long cutting life. Available in single- and double-end types, in small and large diameters, with 2, 3, and 4 flutes, with straight or ball ends, in over 1000 stock sizes.

TANG STYLE DRAI BAR STYLE

• RELTOOL END MILL HOLDERS are made in both Tang and Draw Bar Style, and with Marse or Brown & Sharpe Taper. Sizes over 3/4" have Dual Set Screw. For complete list of sizes and prices see Reltool Catalog No. 50 and latest Discount Sheet.



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plant engineering at Bruntons Ltd., Musselburgh, Scotland, manufacturers of wire and wire rope.

The Cushman Chuck Co., Hartford, Conn., has elected Harry E. Sloan, president of the company since 1928, chairman of the board. Mr. Sloan will complete 53 consecutive years of service in the fall of 1952. Harry E. Sloan, Jr., who has served under his father as vice-president and secretary since 1939, now becomes president of the company.

Two new appointments have been announced at Norton Co., Worcester 6, Mass. David Reid, assistant superintendent of organic products, was named superintendent of grain and bond plants. Roger J. Dufresne, assistant foreman, resinoid department, was appointed assistant to the superintendent of organic products.

Samuel Sloan Auchincless has been named executive vice-president of DeWalt Inc., subsidiary of American



W. E. Anderson



S. S. Auchincloss

Machine & Foundry Company, it was recently announced by Morehead Patterson, AMF board chairman and president. Associated with American Machine & Foundry Company since 1946, Mr. Auchincloss is director of operations of AMF's Colorado Springs plant.

Wallace E. Anderson has been promoted to division superintendent of the newly created Precision Tool & Gage Div., Brown & Sharpe Mfg. Co. Samuel H. Waughtel, Jr., was also named division foreman as a part of Anderson's organization.

Since serving his apprenticeship with the company Anderson has completed many important assignments in both production and sales.

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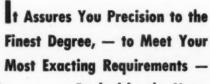
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SPECIALIZING IN Your PROBLEMS equipment and laboratories, specialize in finding the answers to **your** toughest metal cutting prob-lems. Here at MILFORD, modern metallurgical science is teamed with practical manufacturing know-how gained in over 75 years of specialized experience. The superb result is the MILFORD Blade that will cut more metal faster and at lower cost than ever before STANDARD OF QUALITY THE WORLD OVER THE HENRY G. THOMPSON & SON CO. SAW BLADE SPECIALISTS FOR OVER 75 YEARS NEW HAVEN S. CONNECTICUT PROFILE AND BAND SAW BLADES

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Catalogs, bulletins available from manufacturers

. . books, films

- 1. A completely new 32 page catalog describes how Di-Acro metalworking machines perform a wide variety of forming, cutting and punching operations in medium and light weight materials. In two colors, a feature is the arrangement of machine specifications and material forming capacities into tabular form for quick, ready reference. It also describes photographic case histories of how numerous companies are applying "die-less duplicating" techniques, a listing of accessories and descriptions of seven basic machines available in 36 sizes. O'Neil-Irwin Mfg. Co., 562 Eighth Ave., Lake City, Minn.
- 2. "The Story of B. Jahn Production-Proved Dies," dramatically illustrates typical problems that have been solved. Of particular interest is the graphic description of the special machining and manufacturing facilities available in the large Connecticut plant. The B. Jahn Mig. Co., New Britain, Conn.
- 3. Dimensions, internal structure and description of the G & H collet type indexing fixture, which is designed to speed the machining of pieces requiring several similar operations on one machine such as millers, grinders, shapers and drill presses, are included in a folder available from Gustafson Engineering Co., 327 Elm St., Dept. BB, Fitchburg, Mass.

4. A 15-inch precision level, an extremely sensitive instrument to determine true level of bed ways, level machinery, detect distortion of machine bends and level boring tables, surface



This is an illustration of a safety poster that will be sent free to anyone who wishes it. Write Cleco, 5125 Clinton Drive, Dept. BB, Houston 20, Texas.







ARO's new push-button valve means instant reverse action...no need to remove from work...no stopping to turn levers...no wasted time.

Adjustable clutch (available with positive clutch) Length 7-11/16"...outside diameter 1-5/16"... weight 1.4 lb.

This outstanding tool must be seen in action to appreciate its amazing action. Write for literature. The Are Equipment Corporation, Bryan, Ohio.

Are Equipment of Canada, Ltd., Toronto



AIR TOOLS AISO...LUBRICATING
EQUIPMENT...HYDRAULIC EQUIPMENT...AIRCRAFT
PRODUCTS....GREASE FITTINGS

plates, jigs, fixtures and large work pieces or wherever horizontal planes must be determined within close limits, is described in a folder just issued by Pratt & Whitney, Division Niles-Bement-Pond Co., West Hartford 1, Conn.

5. "Pipe Threading Machines" is the subject of a new bulletin, No. 100—A, describing and illustrating machines designed primarily for accurate threading of oil field pipe to comply with Ameri-

can Petroleum Institute specifications, along with specifications, published by Wm. K. Stamets Co., Dept. PT, Jenkins Arcade Bldg., Pittsburgh 22, Pa.

6. A new bulletin lists sizes of ASME and standard types of flanged and dished heads available for immediate shipment from stock. Heads are suitable for pressure vessels, tanks, boilers and other applications such as ladle and melting furnace bottoms, ends for annealing pots, etc. Joseph T. Ryerson



PROBLEM: MILL 231/2" x 21/4" SUR-FACE OF TANK CARRIER!

The material – the toughest armor plate casting yet devised for military purposes! An impossible operation with other types of cutters tested.

SOLUTION: STOCK REMOVAL %" to

Finished surface parallel within .002 - NO REJECTS! A smooth machine like finish at 10½" per minute.

HERE'S THE NELCO TOOL THAT SOLVED THIS VITAL DEFENSE BOTTLE NECK!

The rugged virtually indestructible NELCO Taper Shank End Mill – A 4" carbide tipped cutter that literally chews away half an inch of the toughest alloy Armor Plate America has produced – leaving a smooth, accurate machine-like finish.

Write for catalog and complete details on this husky NELCO TAPER SHANK END MILL and the hundreds of other NELCO Engineered Carbide Tools – TODAY!



NELCO TOOLS

NELCO TOOL COMPANY, INC., MANCHESTER, CONNECTICUT

& Son, Inc., Box 8000-A, Chicago 80, Ill.

7. A bulletin showing applications for the new J & L universal chaser grinding fixture and adapters, including sharpening or changing the top rake on tangent chasers, changing chamfer angles on tangent chasers and sharpening or changing chamfers on radial die chasers, will be sent following inquiries to Jones & Lamson Machine Co., Springfield, Vt.

8. This new 60 page book contains helpful information for users of abrasive discs on surface grinding operations. Contents include abrasive fundamentals, selection information, types available, markings, spindle speeds, coolant selection, dressing, safety, grinding various materials and care of discs. Fully illustrated. Write Gardner Machine Co., Dept. BB, Beloit, Wis.

9. "16 Firsts" is a large booklet that presents the DoAll Micro-Step gaging system, setting forth the arguments in



KENT-OWENS Milling Machines

favor of this new system that discards the inch as a unit of measure and explains numerous applications, along with illustrations. Attractively presented. The DoAll Co., Dept. BB, Desplaines, Ill.

10. A new bulletin on Ry-Die, a 5 % chromium type air hardening tool and die steel, gives chemical analysis, hardening characteristics, wear resisting properties, instructions for heat treatment, and lists typical applications.

Joseph T. Ryerson & Son, Inc., Box 8000—A, Chicago 80, Ill.

11. This folder describes various applications where Gillen groove pins can be utilized as fastening units to join two or more fixed or movable parts. Five types of pins are shown with applications covering many fastening or joining requirements. John Gillen Co., Inc., 2554 S. 50th Ave., Cicero 50, Ill.

12. A bulletin showing and describing



the Sealdraulic 2000 p.s.i. series oil cylinders—developed to provide a line of cylinders for use in hydraulic circuits operating at pressures between 1500 and 2000 p.s.i.,—and advertising a size and mounting for every application, will be sent interested readers writing to the Fishburne Machine Co., Asheville, N.C.

13. Shown in a 16 page brochure are prices, sizes and descriptions of metal stamps, marking devices, steel letters and figures, engraved steel and brass

dies, steel symbol stamps, embossing dies, tags (metal, fibre), metal stencils, supplies, badges, etched plates, etc., published by The Dickey-Grabler Co., 10302 Madison Ave., Cleveland 2, Ohio.

14. "Cutting Gear Teeth on a Milling Machine," contains instructions on cutting worms and worm wheels, and spur, helical and bevel gear teeth on a milling machine when the usual specialized machines for these operations are not available or where only a single gear





1, 2, 3 and 4 spindle models . . . speeds from 4,000 to 10,000 r.p.m.

is required for experimental machinery. Sixty pages, profusely, illustrated, The Cincinnati Milling Machine Co., Dept. BB, Cincinnati 9. Ohio.

15. A folder just issued describes the capacity, nomenclature, description and type of performance of the Grind-O-Matic centerless grinder being manufactured by the Grind-O-Matic Mfg. Co., 5905 Pacific Blvd., Huntington Park, Calif.

16. Numerous applications, with illustrations and descriptions are shown throughout a booklet regarding the universal cutter grinding fixture units and standard accessories published by Rocheleau Tool & Die Co., Leominster, Mass.

17. A new quarterly publication containing numerous case histories of new and rebuilt machine tools has just been issued by Simmons Machine Corp. Included in the first issue of this well-

step up production with



STOW flexible shaft MACHINES



These dependable STOW FLEXIBLE SHAFT MACHINES save production time... speed up output... help lower production costs. Variable Speed Models shown are easily portable... cut down operator fatigue and increase on the job efficiency!

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STOW

Manufacturing Co., Inc., 30 Shear St., Binghamton, N. Y.

illustrated publication, called "The Simmons Way," are examples at Ingersoll-Rand Co., DeLaval Steam Turbine Co. and engineered rebuilding at Simmons. Those interested write Simmons Machine Tool Corp., Dept. BB, 1725 N. Broadway, Albany 1, N.Y.

18. A 20-page booklet (Bulletin SG-52) lists prices of standard thread gages including thread plug gages, thread ring gages and thread setting plug gages for machine screw and fractional thread

sizes. Types and uses of thread setting plug gages are discussed. Write **Detroit Tap and Tool Co.**, 415 **Boulevard Bldg.**, **Detroit 2**, **Mich.**

19. A 64-page, profusely illustrated manual devoted to effective "Tool and Die Salvage Welding" procedures, is now being distributed free of charge by Eutectic Welding Alloys Corp., 172nd St. and Northern Blvd., Flushing 58, New York, N.Y.

20. Mattison Machine Works have just

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issued a new circular on their highpowered precision surface grinder containing latest pictures and specifications on this machine. It is made in table sizes from 12"x36" up to 36"x192" and larger. Write Mattison Machine Works, Rockford, Ill.

75,000

21. A catalog, just issued, gives a comprehensive story about equipment for converting standard machine tools to improved performance through hydraulic duplicating. Installed on present

machine tools it usually eliminates need for additional special machine tools. Write Turchan Follower Machine Co., 8259 Livernois Ave., Dept. BB, Detroit 4, Mich.

22. Work transfers are entirely eliminated and set-up time is lessened with the Knight No. 50, vertical milling and precision boring machine, a versatile machine that is said to do the work of two or more single-purpose machines. Full information will be sent by writing



on your letterhead to W. B. Knight Machinery Co., 3920 W. Pine, St. Louis 8, Mo.

23. A two-color wall instruction chart, "Proper Care of Punches and Dies," showing how to protect tool life and how to get maximum service from punches and dies, will be sent upon written request to The Cleveland Punch & Shear Works Co., Cleveland 14, Ohio.

24. "XL" Bond, the name of Chicago Wheel's new line of silicon carbide

vitrified grinding wheels, especially made for carbide tool and cutter grinding, for rough, finish, offhand and precision grinding, are all explained in literature available from the Chicago Wheel and Mfg. Co., Dept. MT, 1101 W. Monroe St., Chicago 7, Ill.

25. All 27 models of the Cooley electric heat treating furnaces are shown and features such as the Cooley package unit of furnace and integrally wired control panel, incorporating pyrometer,



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line switch and fuses, are described in a catalog that will be sent by writing Cooley Electric Mfg. Corp., 36 S. Shelby St., Indianapolis 7, Ind.

26. Claiming easy adjustment, easy operation, and adaptability to individual requirements, the internal grooving tool designed for use in any hand drill, automatic drill press or screw machine, is described in a brochure available from Waldes Kohinoor, Inc., 47-16 Austel Place, Long Island City 1, N.Y.

27. An illustrated brochure giving complete details, specifications and prices on the improved line of Procunier high speed tapping heads will be sent by writing Procunier Safety Chuck Co., 14 S. Clinton St., Chicago 6, Ill.

28. Claiming savings of up to 50% on grind costs, the new Buckeye belt grinding attachments for use on horizontal grinders, which combine the maneuverability of the portable grinder with the utility of the abrasive belt are



explained in literature from Buckeye Tools Corp., Div. 14, Dayton 1, Ohio.

29. A drill turret that fits any standard machine without altering the machine, that drills, reams, counterbores and taps up to ½" dia. in any material is illustrated and described in literature on Lign-o-matic turret, by Howe & Fant, Inc., 525 Flaxhill Rd., So. Norwalk, Conn.

30. Information on how to convert old screw machines into modern, high-pro-

duction equipment economically, through use of a Lipe automatic magazine-loading bar feed, to boost output 30% and more, will be explained by information from Lipe-Rollway Corp., Syracuse 1, N.Y.

31. A folder showing detailed drawings of the various models of Kelly clamps featuring balanced design, positive gripping control and one hand release for welding, woodworking, gluing, all mechanical production, etc., has been



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published by Robert J. Kelly Mfg. Co., Box 61, Broadway Sta., Newport, N.J.

32. A brochure on the Dickerman height gauge that describes such features as universality, rigidity, adjustment and settings of the three column lengths-10", 14", 18"-and shows applications through illustrations, has been issued by H. E. Dickerman Mfg. Co., 321 Albany St., Springfield, Mass.

33. Two bulletins and a catalog have

been issued by the Flexonics Corp. One bulletin describes RT-6 and RT-8 all purpose tubing and ducting flexible metal hose and the other shows CMH machine tool conduit and fittings. The catalog covers all types of Chicago metal hose. Flexonics Corp., 1322 South Third Ave., Maywood, Ill.

34. A new technical bulletin describing their precision tool-room vise, designed for jig borers, surface grinders, drill

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presses, and tappers, may be obtained by writing The Producto Machine Co., Bridgeport 1, Conn.

35. An abrasive cutting saw with cross feed, that is claimed to cut all metals wet or dry at the rate of four seconds per square inch, the M16, is described in a four page folder distributed by Stone Machinery Co., Inc., Fayette St., Manlius, N.Y.

36. Metal working men will find a wealth of information on how to draw and form aluminum sheet, plate, tubing and pipe in "Aluminum Forming," a new 148-page technical manual just

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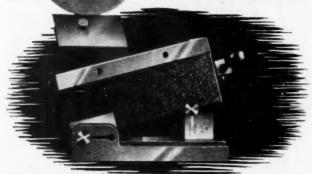
published by Reynolds. The big difference ofttimes in working regular metals as compared with aluminum is described. For copies to those qualified send request on letterhead to Reynolds Metals Co., 2500 So. Third St., Louisville, Ky.

37. The new Model BM-2055 Burr-Master for chamfering zerol bevel gears is described in Bulletin No. 2055, showing descriptions of the operating cycle and work mounting fixture as well as construction details and specifications. Address Modern Industrial Engineering Co., 14230 Birwood, Detroit 4, Mich.

38. An illustrated, two color, 16 page catalog, "The Science of Economical Shelf Storage," discusses benefits of using Rotabin rotary shelving to store parts, tools, materials, etc. Write The Frick-Gallagher Mfg. Co., Wellston,

39. A catalog, No. DMU, and price list describing and illustrating materials

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handling products, shop boxes, shop equipment, compartment drawer units, small parts cabinets, service carts, etc. has been issued by Bay Products Inc., 3001 No. 16th St., Philadelphia 32, Pa.

40. A new color folder titled "Engraving Machine and Accessories" will be mailed to those who write for it. Descriptions and pictures of the Preis-Panto engraving machines, electro marker, the motorless engraver, and cutters and collets are included. Write

H. P. Preis Engraving Co., Dept. BB, Hillside, N.J.

41. Catalog No. 72, incorporating many improvements, modifications and additions to their line of electric grinders and buffers along with accessories, will be sent after inquiry to The Hisey-Wolf Machine Co., Cincinnati, Ohio.

42. A new catalog, 52, lists hundreds of Kennametal cutting tools, some new, some improved. All products are grouped and listed for maximum con-



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venience in selecting, specifying, and ordering. Kennametal Inc., Latrobe, Pa.

43. "American National Pipe Threads-Designations and Differences in Specifications," is the title of a bulletin that deals not only with different types of taper pipe threads, straight pipe threads and their purposes but also gives the proper designation letters by which such threads can be specified. The Eastern Machine Screw Corp., New Haven 6, Conn.

44. Catalog No. D contains some of the newest developments in the gaging industry including information on bore gages, dial snap gages, dial groove and groove location gages, and dial pitch diameter gages. Write Nilsson Gage Co., Inc., Poughkeepsie, N.Y.

45. Precision Spring Corp. has a new standard die spring chart showing types of springs available and methods of selecting the proper spring for the job. Write Precision Spring Corp., Midland & Peterson, Detroit, Mich.



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Engineering Mechanics

By Archie Higdon, professor theoretical and applied mechanics, Iowa State College, and William B. Stiles, professor of engineering mechanics and associate director, Engineering Experiment Station, University of Arkansas; 505 pages, \$6.65. Published by Prentice-Hall, Inc., 70 Fifth Ave., New York, N. Y.

Emphasis is placed on an understanding of the principles employed in the solution of problems rather than on a rote process of substitution in numerous formulas, an effort being made to have the student grasp mechanics, not as a series of formulas or manipulative operations, but as well-comprehended mechanism for stripping problems of

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Handbook of Engineering

By Ovid W. Eshbach, under a staff of specialists. Published by John Wiley & Sons, Inc., New York. Price \$10.00.

This second edition has much of the first's material, yet many of the fields have been reviewed or partially revised. These revisions in more or less degree include mathematics, units and international standards, theoretical and applied mechanics, the section dealing with statics, kinematics, kinetics, and application to frictional phenomena, fluid mechanics, thermodynamics, elec-



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tricity and magnetism, engineering materials, and engineering law. This extensive volume seems to embody those fundamental laws and theories of science which are basic to engineering practice. It is essentially a summary of the principles of mathematics, physics, and chemistry, the properties and uses of engineering materials, the mechanics of solids and fluids and the commonly used mathematical and physical tables.

Reports I, II, III, International Labor Organization

Fourth session, Geneva, Switzerland. These include the General Report, Vocational Training and Promotion in the Iron and Steel Industry, and Welfare Services in the Iron and Steel Industry, as first, second and third items on the agenda. Published by the International Labor Office, Geneva, Switzerland.

For those interested in the inter-



national picture, this set is interesting. The six chapters of the first volume include: Supply and Demand on the Iron and Steel Market; Modernization and Development Plans; Labor Conditions (Europe, Asia, Africa); Industrial Cooperation; Principal Social Provisions (European coal and steel); International Cooperation.

The second report deals with, Vocational Training and Promotion in the Iron and Steel Industry, and the third deals with Welfare Services in the Industry.

The Saga of the Abrasives Industry

By Muriel F. Collie. Published by The Grinding Wheel Institute and The Abrasive Grain Association, Greendale. Mass. 386 pages.

Not a technical publication in the truest sense, the book is a very com-



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Industrial Furnaces (Fourth Edition) Vol. 1

By W. Trinks, Associated Engineers professor emeritus of mechanical engineering, Carnegie Institute of Technology, Pittsburgh, Penn, 526 pages. Price \$10.00. Since its initial publication in 1923, "Industrial Furnaces" has been regarded highly by practicing engineers. This fourth edition brings the treatise up-to-date by incorporating recent knowledge and principles. About 40% of the text has been rewritten and 94 new illustrations added. Essentially the volume is for designers and users of industrial furnaces who want to know how to get the best value out of the

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Vocational Preparation and Information Manual

By H. E. Linsley, Associate Editor, American Machinist. Published by The Herbert D. Hall Foundation, Newark, N. J. 231 pages, accompanied by Teachers' Guide," 191 pages.

This book is devoted to an analysis of the basic needs and functions of industry. Its aim is to help youth on the secondary school level to an understanding of these needs and functions sufficient to enable them to better select, prepare for, and perform the job for which they are best qualified. Profusely illustrated and interestingly written.

The Grinding Wheel

By Kenneth B. Lewis. A textbook of modern grinding practice. 397 pages. Price, \$3.50. Printed by The Rumford Press, Concord, N.H.

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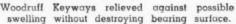
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mentals of abrasive technology. The Grinding Wheel Institute, sponsor, is made up of the manufacturers of grinding wheels and abrasives.

Alcoa, An American Enterprise

By Charles C. Carr, director of public relations. Alcoa. Publishers, Rinehart & Co., Inc., New York, N. Y. 292 pages.

This history of Alcoa is similar in many ways to that of other great American industries. Yet, it has met situations for which it would be difficult to find parallels in other industries. Alcoa was built on the research that Charles Martin Hall, in 1886, at the age of 22, began in a woodshed in Oberlin, Ohio. Here is the full story, from its pioneering mill plant days to the present.

DuPont, The Autobiography of an American Enterprise Distributed by Charles Scribner's Sons, New York. 138 pages.

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Design and Use of **Cutting Tools**

By Leo J. St. Clair, cutting tool consultant. Published by McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York 36, N. Y. 437 pages. Price \$7.00.



This is a practical treatment of the many problems involved in selecting, designing, grinding and using machine cutting tools. Written in language the shopman can understand, the book shows how to use cutting tools more efficiently and economically while turning out better work. Such things as tool angles—side and end relief, angle of clearance, side and back rake—are treated in detail. There are over 50 ideas for increasing tool life and over

20 hints for strengthening the cutting edge of the tool.

Control of Materials, Tools,

By Curtiss-Wright Corp., Wood-Ridge, N. J. 196 pages.

This, Vol. 2, profusely illustrated, excellently made, deals with the machinability research program sponsored by the U. S. Air Force, Resources Planning Section, Industrial Planning Division, Air Materiel Command. The



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result of two years' testing was published in Vol. 1. It is suggested that in order to derive the most from Vol. 2, the reader should become acquainted with the early chapters of the preceding volume.

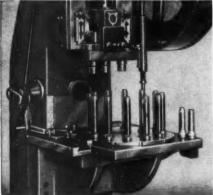
Machine Drawing

By Deane Lent, assistant professor of engineering drawing. Massachusetts Institute of Technology. Published by Prentice-Hall, Inc., 70 Fifth Ave., New York. 523 pages.

Machine Drawing outlines the de-

velopment of a machine from the design through the detail and assembly stages to the point of starting production. Basic techniques and elementary theory are treated in detail, but presented purposefully, slanted toward their application in actual drafting practice. Fundamental drafting techniques, principles of projection, and conventional representation are presented with great care. A particularly thorough treatment of dimensioning is

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The Welding of Non-Ferrous Metals

By E. G. West, Technical Director, The Aluminum Development Ass'n., formerly Senior Investigator, British Non-ferrous Metals Research Association. Published by John Wiley & Sons, Inc., 440 Fourth Ave., New York, N. Y. 553 pages. Price \$8.50

Every section reveals the writer as a metallurgical authority, but the book is one that successfully informs those who wish to weld in practice. Although essentially a "how to" book, it is also permeated with "why." The welding engineer, welding operator, welding in-

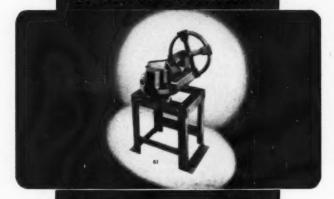
structor and trainee will all benefit from the volume as well as the designer, works engineer and the metallurgist.

The Engineers' Illustrated Thesaurus

By Herbert Herkimer. Published by The Chemical Publishing Co., Inc., 26 Court St., Brooklyn 6, N. Y. 572 pages, 3,000 illustrations. Price \$6.00.

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given. Sketches of related parts are logically grouped for their suggestive value. This volume should be a distinct aid for desk or shop.

Cutting-Tool Materials

By Eric N. Simons, author and co-author of numerous technical books. Publisher, Pitman Publishing Corp., 2 W. 45 St., New York 19, N. Y.; 180 pages; price, \$4.50

An authoritative book on the various types of steels and alloys used in cutting tools, describing their applications, heat-treatment, and composition. Chapters are included on highspeed and carbon tool steel, stellite, tungsten-carbide and kindred alloys, butt-welded and atomic-hydrogen-welded tools, grinding the cutting-tool materials, and on the testing and inspection of tool steels. A useful feature are the appendices, which are arranged alphabetically and give a list of different tools for particular types of work.

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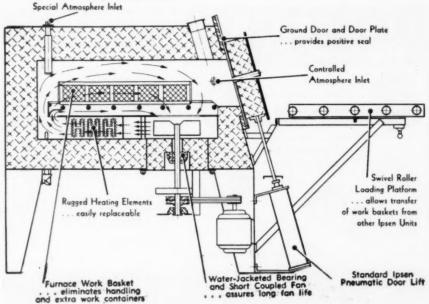
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METALWORKING

Tempering unit developed by Ipsen for bright tempering and controlling oxidation

A unit that makes possible both bright, scale-free tempering, and controlled 'oxidation tempering from 400° F. to 1400° F. was announced recently by Ipsen Industries, Dept. BB, 719 S. Main, Rockford, Ill. Known as the Ipsen D-300 tempering unit, the sealed, controlled atmosphere furnace utilizes a completely new process of controlled oxidation developed recently by the

This shows the recirculation or forced-convection system of atmosphere circulation employed in the new tempering unit. An alloy fan moves the controlled atmosphere continuously throughout the electrical heating element, and then through the load. This element is rated for extremely rapid recovery when a cold load is charged and is designed for easy maintenance.



Ipsen research staff.

For bright tempering, the Ispen D-300 tempering unit is supplied during the entire cycle with a protective atmosphere. After sufficient time at temperature, the load is cooled in the furnace until it reaches approximately 400° F. The bright scale-free work is then cool enough to be removed from the furnace without danger of oxidation. The finish remains clean, bright, and scale-free, and no cleaning or pickling operations are necessary, it is said, before subsequent plating or painting.

The Ipsen D-300 also readily produces a controlled oxide coating, which is often desired to reduce corrosion or wear, and to produce an attractive blue-gray or blue-black appearance. This is accomplished either in a separate operation or concurrently with a tempering or annealing operation.

The unit is also excellent for use in tempering non-ferrous metals because of ease in maintaining extremely uniform temperature. Many such metals are very sensitive to temperature differences, and often the tempering must

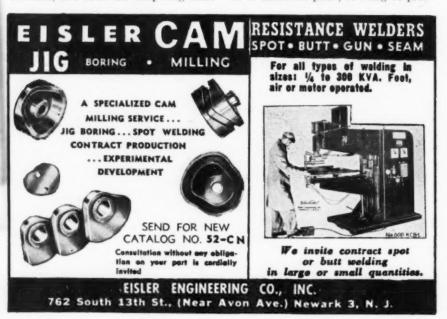
be carried out close to the melting point of some of the softer metals and their alloys. Solution heat treatment of aluminum, annealing of copper and brass, and precipitation or solution heat treatment of beryllium copper are a few of the many applications in treatment of non-ferrous metals.

The Ipsen unit is automatic, sealed and designed for use with a controlled atmosphere, although it can also be used as a conventional tempering unit. The welded gas-tight frame, and the flat, ground door frame and door plate practically eliminate leakage problems. The door construction and airdraulic lifting mechanism are the same as used on other Ipsen automatic heat treating units.

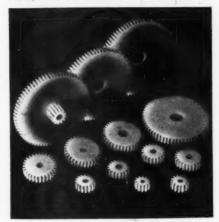
Molded Nylon gears

Molded Nylon gears are now carried in stock for immediate delivery by the Nylomatic Division of John A. English & Co., Dept. BB, Morrisville, Penn.

Available now is a line of spur gears in 48 diametral pitch, 14½ degree pres-



sure angle, ranging from 12 to 80 teeth. Also, not in stock but available on



special order from stock molds is a large selection of unit-molded 48 pitch gear and pinion combinations for use in speed reducer applications. In the near future similar lines in 64, 32 and 24 diametral pitch gears will be offered.

Nylomatic gears are said to give quieter operation, wear better, and allow greater tolerances in center locations

Fast cutting metal-bonded diamond wheels

Ralph Watkins International Trade. 2252 East 75th St., Dept. BB, Chicago 49, Ill., announce their new Double Eagle, fast cutting metal bonded diamond wheels.

Doubling the 100 to 120 percent concentrate of most metal bonded wheels, these are said to have approximately 240 percent concentrate. This is accomplished by compressing the wheel surface a great amount, something impossible to do with a resinoid wheel. As a result of this concentration the life of the wheel is claimed to equal or exceed that of many resin bonded wheels at the same time cutting faster. without excessive wear. A lapping oil should be used with the wheel. It can also be used free hand.

With over \$50,000 worth of diamond



RADIAL DRILLING **BORING** and TAPPING MACHINE

... Featuring internal pillar with full length sleeve to eliminate end lift of arm. Extreme rigidity is assured with easy and positive locking arrangements? 3" diameter drilling capacity in cast iron.

The AJAX Radial Drill meets all the demands of the best high speed steel and carbide tipped tools. High quality materials and workmanship together with the utmost ease of handling the centralized controls guarantee a long and trouble-free life.

PARTIAL SPECIFICATIONS	
fle from ctr. of col.	5'0'
ing surface	3'0'

plate: Length of work: Width of working Height of work: Morse taper

Write today for full specifications.

60 to 1114 rpm

wheels now in stock, the company is able to deliver any shape or size wheel, either American or foreign types, within four to eight weeks. Faster delivery on standard popular sizes in 100 to 150 grit will be made.

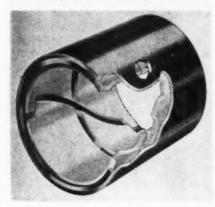
Besides wheels, the firm deals in diamond dust, tools of many types, and other items for the trade, including a lapping oil that is claimed to double the life of a grinding wheel, if used

regularly.

Standard Thin-Wall Nylined bearings

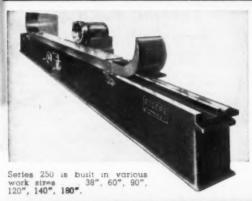
A new type of Nylon-lined bearings has been developed by Thomson Industries, Inc., Dept. BB, Manhasset, N. Y. These bearings consist of a thin, drawn steel outer sleeve and a free floating liner of DuPont FM 10001 Nylon. They are called Standard Thinwall Nylined bearings, and are initially being offered in ten sizes ranging from 4" to 11/4" i.d.

Thinwall bearings are said to provide bearings of resilient material which resist poundout, decrease friction, permit dry operation, damp mechanical vibration and minimize abrasion failures. They are corrosion resistant and can be operated submerged in most



liquids. These extremely compact, light weight bearings are suitable for close fits and will give long life.

OGERS MASSIVE Series 250 ODUCTION FACE GRINDER



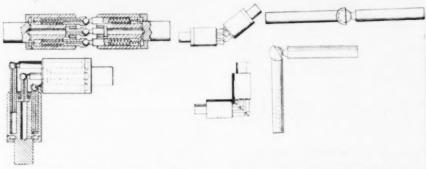
Now . . . ROGERS New Series 250 gives you a combination of speed, low cost and accurate grinding. Straight edges or flat faces with overall dimensions of 20" high z 20" wide x 120" long, weighing up to 2 tons, can be handled smoothly by the 120" massive grinder. (Other sizes listed below). 26" segmental grinding wheel driven by a heavy spindle 40 HP motor provide fast stock removal . hydraulic or variable speed gives you a combination of speed, ... hydraulic or variable speed table drive up to 100 fpm . . . extra wide "V" way bearings and extra wide "V" way bearings and
10 ton base . . are a few of the
many features. If you wish to
figure production costs, please
send sketches ar prints of work
to be ground when writing for
further information. Write today.
Also shear blade and carbide tipped or regular saw grinders.

AMUEL C. ROGERS & CO. SINCE 1887 207 DUTTON AVE. BUFFALO 11, N. Y.

Universal joint operates at any angle under load

Flexi-Versal, 1102 N. Monroe, Dept. BB, Peoria, Ill., is marketing something new that promises wider utility in the way of universal joints. These are said to operate with constant velocity at high r.p.m. and full load at any angle

Furnished in two types, No. 1 (shown in horizontal position), will provide any angle up to 40 degrees. No. 2 (shown at a 90° angle), will provide angles from 40° to 95°, five degrees beyond a right angle. Springs in the former act as a safeguard to keep pins in proper alignment when crossing over center. They

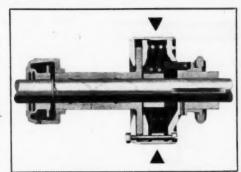


within 190° (included angle) and have been tested under load at 5000 r.p.m. and higher. are not necessary in the latter. Pins travel in an orbit and do not revolve but as the universal revolves, the holes

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THAT'S THE LENGTH OF SERVICE RENDER-ED BY MANY OF OUR CLUTCHES. It is sturdy, reliable, and free from troubles, proven by years of application. Available with automatic Ring-Oiling Sleeve. Actuated by simple Anti-Friction Roller Toggles that require no lubrication, but which produce powerful engaging forces, on dual, lagged, friction surfaces. This means faithful, unfaltering service, even with frequent engagements.

WRITE FOR BULLETIN No. 258



BROWN ENGINEERING CO.

126 N. THIRD ST. READING, PA.

turn around the pins. Therefore, the ball sockets do not turn but merely act as a hinge in changing angularity.

A center pin only holds the universal together and in many applications is not necessary. These universals may be built with from three to eight pins of any size depending on the applica-tion and torque load desired.

As the universal revolves the pins move in and out with a reciprocal pumping action and, as all of the holes are interconnected, lubricant is kept in constant motion from one hole to another. Lubricant passages in the female part of the ball sockets give positive lubrication.

The new universal is claimed to be much more efficient than mitre bevel gears, having a multiplicity of pins working instead of one tooth and providing for a much higher r.p.m.

Mechanical indexing table

A new mechanical indexing table. known as the Hautau-Turndex, is said to be able to move heavy loads from station to station within 3/5th of a



second indexing time. The unit is being manufactured by Turner Bros., Inc., 2625 Hilton Road, Dept. BB, Ferndale, Mich., who state that its design is based upon an entirely new pattern of movement, every cycle of which is controlled by the uniform gear tooth area of a master sector gear. The intrinsic accuracy of gears, represented by this

COOLEY HEAT TREATING FURNACES

ELECTRIC BOX TYPE . FLOOR AND BENCH MODELS For Tools and Small Parts





Max. Temp.	Sizes	Price
2000°	12" x 8" x 18" 12" x 8" x 24" 12" x 8" x 36" 15" x 12" x 30"	\$985 to \$1350

All prices are less controls. Any standard controls available for automatic temperature control.

- · With Cooley design, the door is virtually another wall, equally insulated with the others-entire hearth is usable
- · Natural thermal convection.
- · Easily removable heating elements.

Controlling Pyrometers carried in stock — available for all applications. Free on request: COMPLETE CATALOG "SHOP NOTES ON HEAT TREATING"

OLEY BLECTRIC MANUFACTURING CORP.

master sector gear, establishes, it is said, the basic and unvarying accuracy of the table.

A significant feature of the table is the set of cams which control the master sector gear. These cams are designed to directly govern the acceleration and deceleration of the table in order to completely eliminate abrupt starting, stopping, or catapulting action. Maximum production speeds are thus easily maintained. It is stated further that were it not for the normal safety precautions in the interests of machine operators, it would be possible, without harming the indexing table, to operate the unit at speeds of as much as 1/5th of a second indexing time.

Only one horsepower is required to operate a 24 inch unit with an 800 pound work load on the table top. Standard units are available in from two to 26 stations, in any equal division of 360 degrees, but the table may be adapted to a larger number of stations if desired, or applied as a driving unit for indexing larger rotary tables up to 12 feet in diameter.

The table is being adapted for milling, drilling, reaming, boring, counterboring, crimping, stamping, assembling, etc.

Chucking levers for screw machines

Chucking levers for No. 00, No. 0 and No. 2 screw machines are now available from Boyar-Schultz Corp., 2108 Walnut Street, Chicago 12, Ill.

These important parts are stocked in quantity and can be supplied immediately to users of screw machines. Longer life is claimed because of the high allow materials used in their manufacture.

Radius dresser rotates 360°

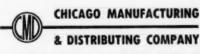
One of the special features of the radius dresser made by the Trefz Mfg. Co., Dept. BB, 4422 N. 6th St., Philadelphia 40, Penn., is its ability to rotate 360°. This insures cutting a perfect u-shaped concave radius of any dimension from 1/32" to 7/16" on 7" wheels. The Trefz dresser is said to be es-



PAY OFF in higher production

...Because they have better anti-scoring qualities to work under extreme pressures.

Use CMD on your lathe centers, die set leader pins, steady rests, machine ways, cams, broaches, thrust bearings, taps and dies, to name a few. In fact, CMD lubricants work every day under pressures of 40,000 to 50,000 pounds per square inch in thousands of plants from coast to coast.



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on steel, plastic and other metals you can be sure when you specify

The PREIS PANTO line of engraving machines and accessories are precision built and light in weight but engi-

neered for service by experienced engrav-ing machine specialists who know how to design and build engraving machines.

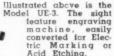




Mudel UE for electric mark-ing and arid ing and



Model CG Sturdy preci-Grinder.





PREIS Universal Work Holding Flxture designed quick release.





H. P. Preis Engraving Machine Co. 647 State H'Way 29 Hillside, N. J. pecially good with a small radius. A special holder permits the same control and accuracy in grinding a convex radius from zero to 5/16".

Independently, this tool is a complete radius dresser. However, it can be used



to dress angles or tangents by simply attaching it to a carrier base or a conventional dresser with an upright column. It can be hitched up at any angle to any lathe or jig-bore where high speed grinders are used.

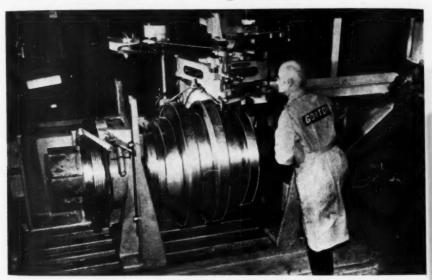
Diamond wheel lap

It is claimed that life of cutting tools can be increased from three to six times and sharp, finish-lapped cutting edges obtained through the use of a new method of wheel lapping developed recently by Penn Scientific Products Co., 5941 Alma Street, Dept. BB, Philadelphia 24, Pa.

Spectrum diamond lapping compound in any desired grit size, produced from pure virgin diamond, is applied to special Spectrum lapping wheels. The Spectrum wheels are made from materials that retain their shape and wear indefinitely and are interchangeable on all tool grinders.

Spectrum diamond lapping compounds for use on the wheels can be obtained in all standard grit sizes and sub-sieve sizes.

Heat treated rolls now engraved by new tracer-controlled roll engraver

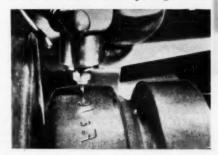


A TRACER-CONTROLLED pantograph engraving machine has just been announced by the George Gorton Machine Co., 1401 Racine St., Racine, Wis. It is said to successfully mill and engrave the surface of large rolls which have been heat treated to 50 Rockwell (C Scale). Until this roll engraver was developed, such rolls had been marked in various ways, including stamping and hand chiseling.

The P-32 roll engraver illustrated is

This tracer-controlled pantograph was designed for engraving letters and numerals on large rolls used in forming "I" beams, railroad rails and reinforcing rods used in concrete work. The roll shafts at either end are cradled on two free-running rollers; an indexing ring attached to one end of the roll shaft is operated by a hand crank with worm and worm gear ring to turn the roll to any desired position. If required, a motorized drive or mechanical indexing fixture can be furnished.

the smaller of two models available,—accommodating rolls up to 36 inches in diameter by 7½ feet long. It consists of a large bed casting, strongly ribbed, which contains an accurate key way running the entire length of the bed in the center. This is used to position the two work holding brackets. On either side of this key way there is a T-slot for use in clamping the two U-shaped work holding brackets, one at each end of the roll shaft. These brackets have 18-inch openings to ac-



commodate roll shafts of varying diameters and each upright has a vertical slot through which clamping bolts are inserted to position and clamp the two cross members which mount the roll shaft supporting rollers.

A heavily ribbed solid rail with a scraped dovetail way on top is bolted to the rear edge of the base. A twodimensional pantograph mechanism is attached to and slides along this dovetail way from one end to the other

of the rail.

Transverse, or cross movement of the pantograph to bring the cutter point over the axis of the roll is also on scraped dovetail ways. When mounting or removing rolls, the pantograph is moved to the extreme right on the rail extension, where it is out of the way.

The pantograph on this machine is the standard Gorton P-32 Pantomill with a special saddle between the supporting rail and the pantograph mecha-

nism.

One of the principal advantages of

numbering, or other designs can be engraved on the curved surface of heat treated rolls by using flat copy or master patterns. These masters can be made simply and economically of steel, sheet iron, brass, wood or plastic, depending upon requirements. If an allover (intaglio) design is required, only a segment of the complete design is made into a master. Then the design is cut in the roll by indexing to each new position in order to create a continuous pattern.

Cutter spindle collet size is 38 inch. Nine speeds are available by belt adjustment from motor from 1.300 to 9,200 r.p.m. Speeds up to 12,000 r.p.m. are available at extra cost or, if desired, this machine can be supplied with two interchangeable spindles: one, the standard belt-driven spindle; and two, a super-speed electric spindle with a

top speed of 48,500 r.p.m.

While the machine illustrated here is manually operated, automatic or motorized masters can be employed in certain cases. Likewise, automatic camoperated spindle down feed can be pro-



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vided as well as automatic work piece

rotation or indexing.

Floor area required for this machine with approximately two feet of clearance all around is 196 inches by 95 inches. Overall length of machine is 148 inches, width 46½ inches, height 78 inches. Net weight is approximately 10,000 pounds. Roll capacity of this machine is 36 inches in diameter by 7½ feet long. The larger model, not shown here, is identical to this machine except for a longer base and rail for the accommodation of rolls up to 36 inches in diameter by 12 feet long.

Pantograph reduction ratios are 1 to 1, 2 to 1, 3 to 1, 4 to 1, 5 to 1 and 6 to 1 only. Intermediate reductions are easily obtained by using the built-in scale (.020" increments) and formula provided in the instruction

manual.

Stub taper turret tool holder

Scully-Jones & Co., 1907 So. Rock-well St., Chicago 8, Ill., announces a new sleeve type stub taper turret tool holder. It is designed for holding counterbore cutters, countersinks, core drill cutters and similar tools having standard stub taper shanks. This holder shortens the projection or overhang between turret and work and eliminates

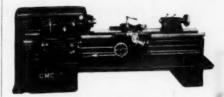


the need for conventional type holders, assuring a simple but rigid set-up.

The holder is hardened to resist nicking and burring. The o.d. is ground to assure a good fit in hole of turret. The splined section engages the tang on the shank of the cutter for a positive drive—eliminates slipping and cutter damage. Available for Nos. 2, 3 and 4 stub tapers.

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TOOL ROOM LATHE



Backed by over 80 years of Precision Tool Manufacture

Here are ALL the features you want in a quality, precision built tool room lathe.

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NEW EXTRACTOR

removes bushings from blind holes
...cuts time 75 per cent

The entirely new method of extracting bushings, bearings, sleeves, liners, etc. Eliminates necessity for machining, minimizes the hazard of injury to casings or excessive dismantling of equipment. handles holes from 1/2 to 2" - over 5 tons have been extracted with unit. Eliminates as much as 75 per cent of labor and time, slashes inventory. For complete information write Department 000.



CROZIER Machine Tool Co.

684 NO. PRAIRIE AVENUE HAWTHORNE, CALIFORNIA

All-purpose hand blade saw

Only the teeth of the Rocket, a new high speed hand blade, made by the W. O. Barnes Co., Dept. BB, 1297 Terminal Ave., Detroit, Mich., are hardened. The back is semi-hardened to retain flexibility.

The blade is said to be a flexible, safe all-purpose blade, which due to a gradient hardness, combines cutting ability, flexibility and safety in perfect balance, in one blade.

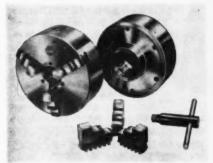
Waterproof sandpaper

Behr-Manning Corp., division of Norton Co., Troy, N. Y. announces the development of a new waterproof sandpaper for industrial users, Tufbak Speed-wet Durite paper.

Highlighting the features of Tufbak are freeness of cut and ability to maintain the initial sharp "bite" necessary in wet sanding. An extremely tough backing permits maximum flexibility. Its increased body strength resists creasing, cracking and curling.

3-jaw lathe chuck

The latest addition to the line of lathe chucks made by Westcott Chuck Co., Dept. BB, Oneida, New York, is the No. 6907 6" 3-jaw universal chuck with threaded body back for direct



mounting on lathes, milling machines, grinders, and other machine tools with 21/4"-8 spindles.

Since no adapter is required, the chuck is mounted close to the spindle bearing, thus minimizing chatter which may be caused by excessive overhang.

5 HH Landmatic head

The 5 HH Landmatic head is a stationary, self-opening die head with a range from No. 4 to %" diameter. Designed for application to turret lathes, hand screw machines, and automatic screw machines employing a stationary type head, it is manufactured by Landis Machine Co., Waynesboro, Pa.

The small number of working parts are made of a special alloy steel, hardened and precision ground.

The 5 HH head is slightly longer and greater in diameter than its predecessor, the 5 H type. These larger dimensions provide greater strength.

Opening action is obtained by interrupting the forward travel of the turret slide, or carriage. If the "pull off" opening action is not desired, the head may be opened by hand. Closing of the die head is achieved by hand.

Chaser holders operate in dovetail slots in the head body.

For cutting left-hand threads, left-



Special exclusive RED-E features mean unmatched versatility for GREATER SAVINGS in time, labor, money. Quick changeovers, simple installation, finger-tip control, perfect balance, accuracy and adjustability assure greater economy, mirco-precision and stepped-up production that you can't afford to pass up!

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If you want MORE PARTS per hour LOWER COST per part

the BARKER WRENCHLESS CHUCK can do it faster, better and stand up to it longer. Where the run is continuous on turrets, engine lathes, cutting off machines, drill presses or any other type of chucking machine, these Chucks will increase production and pay for themselves in 60 to 90 days while

doing it. See how a Barker Wrenchless Two-Jaw or Three-Jaw Chuck can speed up production in YOUR plant.

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HOUSTON

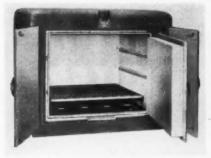
hand chaser holders are required. However, no other changes are necessary for left hand threading and the same chasers may be employed for both right and left hand work by merely grinding the proper cutting angles at both ends of the chasers.

The chaser holders and chasers are interchangeable with the 5HH.

Oven has inconel tubular heater

A new portable electric oven for high temperature processing called Model HT-2 equipped with inconel sheathed sealed tubular heating element, for greater heating efficiency, has been announced by Grieve-Hendry Co., Inc., Dept. BB, Chicago 22, Ill.

The use of portable electric ovens that can be used in any place in the plant, to be moved as desired, has become widespread in industry. Many applications such as baking, drying,



preheating, stress relief of springs and plated parts have been found more adaptable to this type of oven.

The Model HT-2 features a thermostat control with temperature range of 300° to 1000° F. and a stainless steel interior. Two or more of these ovens can be used in a group or bank as they are so constructed to nest one on the other. Individual ovens in a group may be cut out or ovens can be operated at different temperatures.

Construction is heavy gauge steel with a minimum of 4" Fibreglas insulation. Double doors are provided for

COMBINED POWER PUNCHES & SHEARS



"This equipment paid for itself in a few months"

"Best investment we ever made!"

Such comments are typical from Beloit users who have written us. And we're sure you will also be pleased with the performance (price, too) of Beloit Combined Power Punches & Shears now made in 7 sizes to meet practically every production need. Standard equipment includes punching attachment, adjusting stripper, back gauge and shear blades flat and round bars. Extra attachments are available. You'll like the smooth, trouble-free working ef.i ciency of Beloit machines . . . send for full details today.

Alse manufacturers of equipment for spring shops; alligator shears, rod cutters, punches, bending and straightening rolls and related items. Write for catalog.

HENDLEY & WHITTEMORE CO. 100 Blackhawk Blvd. Beloit, Wis.

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• For dependably accurate hardness testing, every part of your testing equipment must be designed by experts. CLARK Hardened Steel Ball Penetrators are designed to give the most accurate possible results in the testing of soft metals such as unhardened steel, cast iron, brass, bronze, and similar metals and alloys. They are available in 1/16", 1/8", 1/4", 1/2", 3/4", and 1" diameters. Specify CLARK Steel Ball Penetrators for more accurate "Rockwell" testing.





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lathe and grinder tail stocks Accurate, low cost turning on tough continuous-run work. Preloaded, matched roller bearings assure rigid set-up. Precision ground shank. Heavyduty grease seal. Many exclusive features.



FALLS PRODUCTS, INC., 122 Genoa Street, GENOA, ILL., U.S.A.

sealing in heat. Size is 30" wide x 25" deep x 24" high outside. Inside dimensions 22" wide x 18" deep x 16" high. 220 volt, single phase is standard. Special sizes may be ordered.

Pocket size metal hardness tester

Peabody Industries, Inc., Dept. BB, 1819 Broadway, New York 23, N. Y., claim a revolutionary development in a pocket-size metal hardness tester which weighs only 7 ounces, whereas standard equipment now in use weighs hundreds of pounds.

The instrument has made possible testing of internal mold and die sections with an area as small as one square inch where heretofore the throat and daylight openings of standard test machines limited testing to the periphery of the work. Tests made by one of the



leading independent laboratories in the country show the instrument to be as accurate as standard heavy equipment, it is said.

Since hardness is checked by rebound, the surface is not marred as greatly as is the case when penetration is used. For calibration and for use with parts weighing less than 15 pounds, a clamping anvil is supplied in order to provide sufficient mass to obtain the full rebound. On work weighing more than 15 pounds, the mass is sufficient and the anvil is not necessary.

This low cost portable instrument allows work (including round parts in lathes) to be tested without removing it from the metal working machine. One brings the tester to the work, rather



than bringing the work to the tester.

The operation of the instrument is said to be simple. Any machinist can get accurate readings after brief instruction. The operator merely extends the spindle to its full height, depresses the trigger, allows it to rebound where it stops and is held automatically, and reads the hardness directly from the calibrated scales on the tester. There are two models, one for steel and the other for use on non-ferrous metal surfaces.

Vinco indicator snap gages

An indicator snap gage for checking splined shafts has been perfected by Vinco Corp., 9111 Schaefer Highway, Dept. B.B., Detroit 28, Mich.

The gage has a straight sided rack tooth or a cylindrical section representing a measuring wire on the bottom and top jaws. The top jaw is movable and actuates the dial cushion movement indicator which is calibrated in increments of .0001". A thumb-operated button lifts the upper jaw, permitting the in-

dicator snap gage to be placed over the splined shaft that is to be inspected.

The gage checks only the actual (dimensional) tooth thickness, at or near the pitch diameter. Variations in tooth thickness are read on the dial in-



dicator. These indicator snap gages are set to set masters, and afford a very fast and comprehensive method of inspecting and controlling the sizes of splined shafts. The size range of these gages is from .0" up to and including 8.00".



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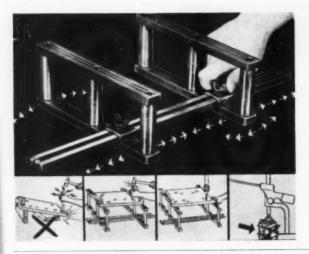
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- Chrome molybdenum cranks, wrist pin connections.
- Easy to maintain economical to operate.
- 5 to 70 tons capacity.
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MARSHALLTOWN MFG. CO. MARSHALLTOWN, IOWA



Called Acro die cradle. an adjustable, portable, safety parallel unit is announced by Acro Safety Parallel Div., 24 South Crawford Ave., Chicago 24, Ill., which, it is said, greatly reduces shop accidents by eliminating haphazard methods of supporting dies, jigs, etc. during drilling, counterboring, tapping, milling or grinding operations. Moreover, it speeds up jobs and permits greater freedom of the user's hands. The heavy duty model is recommended when used on arbor presses.

Dremel screwdriver

Newest in the motor-in-hand tools designed and produced by the Dremel Mfg. Co., Dept. BB, Racine, Wis., is a brace of electric screwdrivers which the manufacturer claims will cut production and assembly costs up to 65%. Light in weight, small in size, they





were designed to be used without fatigue at right angles to the work. The smaller model SD-1 drives free-running screws or nuts from No. 0 to No. 4

inclusive; the larger model SD-2 is for sizes No. 4 to No. 8 inclusive. Model SD-1 weighs but 12 oz., is 4¾" long, with a driver-bit speed of 1200-1400 r.p.m. Model SD-2 weighs 18 oz., is 6½" long, with a driver bit speed of 1400-1600 r.p.m.

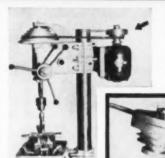
High speed machines for chamfering zerol gears

A new Modern Burr-Master Model BM-2055, the first in a new line of machines for chamfering zerol bevel gear teeth is announced by Modern Industrial Eng. Co., 14230 Birwood, Dept. BB, Detroit 4, Mich. The machine deburrs and chamfers tooth edges at both heel and toe of an 8" dia., 99 tooth, 12.53 pitch aircraft zeroi bevel reduction gear in 30 seconds time, it is said.

Pressing the cycle start button on the machine causes the work to be brought into cutting position by a pneumatic cylinder. The teeth are then chamfered by rotating the work in timed relation to the cutting action of four dovetailtype high speed steel form tools. When



MeW "PULL-GEAR" SPEED-REDUCING PULLEY Increases Drill Press Capacity



Gives a spindle speed range of approximately 75-2000 RPM on standard, light-type drill presses. Makes possible the use of drills up to $1\frac{1}{4}$ " without burning or stalling motor.

Also Ideal for Tapping, Reaming, Boring, etc.

Designed to operate on all types of drill presses and other machines using a V-belt drive. Installed on motor shaft in 5 minutes. No bracket re-

motor shaft in 5 minutes. No bracket required. Drills up to 1/4" in steel. Taps up to 5/8" in steel. Reams and bores up to 3" in steel. Ideal also for spot-facing, counterboring and other operations requiring slower speeds than are normally obtainable on standard machines. Now being used by major industries throughout the nation.

Made in 3 Motor Shaft Sizes-1/2" - 5/4" - 3/4"

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21125 Dequindre St. Hazel Park, Michigan

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Standard thrufeed and infeed work support blades available from stock. Prices on special blades quoted on receipt of prints.

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AUTOMATIC THRUST ADJUSTMENT

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CONCENTRIC TOOL CORP.

2970 Huntington Drive San Marino, California



the cutting cycle is completed, the work is lowered into unloading position automatically.

Four form tools are provided to

chamfer the entire tooth contour at both heel and toe ends. The Burr-Master has a floor space of 28" x 40" and is 70" high overall.

Drilling machine for holes up to 5"

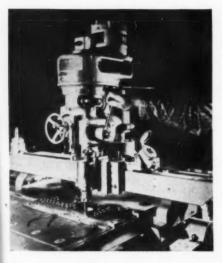
A Wales deluxe model drilling machine for boring plus precision layout, drilling and reaming of holes has just been announced by the Wales-Strippit Corp., 396 Payne Ave., North Tonawanda, N. Y.

This new machine is equipped with a heavy-duty boring head and tooling that permits the boring of holes up to 5" in diameter.

In addition to boring operations, this model is designed to fill a definite need by combining simplicity of operation, easier locating, drilling and reaming of holes in material of practically any length up to 36" wide.

The precision-built boring head with

The precision-built boring head with anti-friction bearings is equipped with an adjustable guide support that is



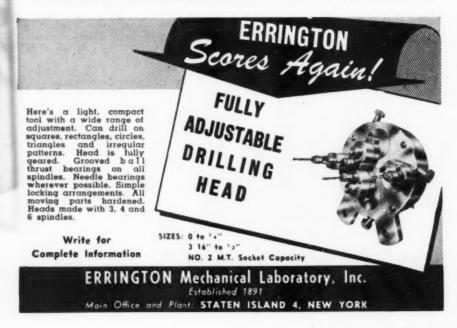
moved down close to the top of the work for precision accuracy during drilling and reaming operations. An extra large bearing area on the boring head assembly base assures travel of 90° on two accurately ground ways across a solid bridge. Another feature is the hand-scraped ways in the table. The work is securely clamped to the long slide rail which moves in these hand-scraped ways and locates the work under the boring head. There's a full-size table with anti-friction ball inserts located over the entire area.

Carnes sump tank cleaner

The W. R. Carnes Co., Dept. BB, Verona, Wisc., has added to its line a new model sump tank cleaning machine, known as their Model No. 20-T, Series "NA."

These units, designed to quickly remove the dirty coolant or cutting oil and all the chips and sludge from the sump tanks of machine tools, operate on a high vacuum principle so that nothing but air passes through the pump unit.

The Model "NA" is made in tank capacities of 100, 150, or 200 gallons,



and each tank is fitted with a sludge compartment which contains a removable sludge basket with a capacity of 100 pounds. The removable sludge basket is lined with a replaceable fabric



filter bag which retains the solids such as chips, sludge, etc., and the clear oil or coolant collects in the storage tank.

The pumping unit consists of a vacuum pump driven by a one-half horsepower motor, and has full automatic controls which shut the pump unit off when the tank becomes filled. To discharge the contents of the tank, the control lever is shifted from "pump" to "discharge," whereupon the air pressure developed by the exhaust side of the vacuum pump quickly discharges the contents of the tank. This model has a pumping rate of 25 to 30 gallons per minute on the average oil or coolant.

Powrarms solve special problem

Powrarms, positioners made by Wilton Tool Mfg. Co., 925-41 Wrightwood Ave., Dept. BB, Chicago 14, Ill., recently combined with a special mobile fixture to solve a ticklish production problem for Southwest Supply Co., of Los Angeles (formerly the Houston Corp.).

Needing a special fixture to hold rectangular parts ranging in size from 2 to 3 inches and up to 18 inches and 12 lbs., a Wilton distributor and the customer got together.

Mobility was needed as all parts had





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This is a powerful machine for heavy or small precision work in use all over the world: Airplane Factories, Ammunition Plants, Toolrooms where fast production is desired. 4 Models No. 16, No. 14, "EL" and Mode "D". The larger the model, the larger the stoke and therefore more filling is performed. Furnished with or without

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GENESEE MFG. CO., INC.
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to move from one assembly operator to another independently. Appropriate fixtures were designed and it was decided to mount the fixtures and Powrarms on a dolly equipped with roller skate wheels which travel on iron tracks af-



fixed to continuous bench height tables. Spring stops on the dolly hold it at each

assembly operation.

The Wilton "Junior" Powrarm is the all-aluminum, light duty version of the Wilton Powrarm positioner line and will hold up to 24 lbs. of weight. It actually provides an assembly operator with a "third arm" as it holds work, positions it, and locks the work at any angle desired. Thus all sides of the work are available to the assembly operator.

Machine finishes name plates

A modification of the Clair Model 203 surface finishing machine has been introduced by Clair Mfg. Co., 1030 S. Union St., Dept. BB, Olean, N. Y. Designated the Model 203-A, this machine was developed specifically for surface finishing formed decorative name plates for refrigerators, stoves, appliances, and automobile trim.

Through a vacuum chuck arrangement, the Model 203-A will handle name

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Universal Joint Drillhead... Full Ball or Bronze Bearing Construction. Standdard and Heavy Duty. From ½" Minimum Centers up. Capacities to 1" in Steel.





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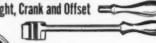
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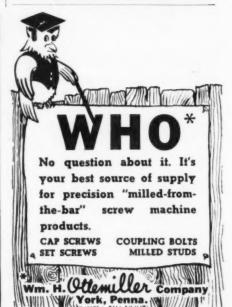




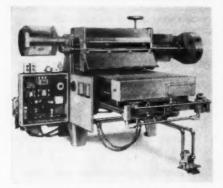
ALSO SCREW CLAMPS, MACHINE VISES, FIXTURE UNITS, MAGNETIC BLOCKS AND ROTARY TABLES.

REID TOOL SUPPLY 700 BAKER ST.

MUSKEGON HTS., MICH.



plates made of brass, copper, silver, plastic, aluminum, wood and other nonmagnetic materials. The manufacturer stresses that even small items can be



held and surface finished without interference with coverage over the entire surface.

An improved feature of this modified unit is the fact that all controls have been assembled at a central control panel. Motors are available in varying speeds up to 15 horsepower in size. Buffs used on this machine ordinarily are 9" in diameter, but can be increased to 12" in diameter if desired.

Punch press stop

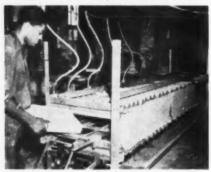
Presstop, a new electro-mechanical punch press stop has just been announced by the Brinnell Co., Dept. BB, Simsbury, Conn., manufacturers of the "Protectron" electronic controls for automatic machines.

Presstop holds down the treadle or hand lever of a punch press electrically, and releases it instantly when the operator pushes a conveniently located stop-button. When operator engages the mechanical clutch, a solenoid in Presstop is energized, automatically engaging a holding latch that holds down treadle or lever for continuous press operation. Stop-button de-energizes solenoid, releases holding latch and allows clutch to disengage. A special cut-out switch permits single stroke operation.



Even drying for plaster molds

Precision plaster molds, used for aluminum casting, are being dried more evenly and precisely with far-infrared



electric heat, according to Mr. W. R. Hale, vice president of Scientific Cast Products Corp., Dept. BB, Cleveland, Ohio.

Scientific's molds are now dried to the close tolerance of .001 inch per inch as compared with .002 variation under the previous batch type, gas-fired method. In the former batch oven the molds near the top, where hot air was forced in, dried faster than those at the bottom. Radiant heat now dries all molds evenly and consistently.

A conveyor moves the molds through the oven at about 1½" per minute maximum. The first 8 feet of the 12 foot oven are heated by 36 Chromalox radiant heaters with a total capacity of 39.6 Kw. The longer far-infrared wave length is absorbed efficiently even by white materials, with negligible reflection—and rapid heating results in short conveyor travel. One size 12" x 22" x 1½" dries in about 1½ hours; the other, 12" x 22" x 2½" dries in 2 hours.

German-built screw machine

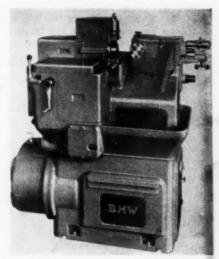
Interchangeable cam assembly units that can be pre-selected and assembled for the next job, while one job is still being run, is said to substantially reduce set-up and down-time on the German-built B M W single spindle automatic screw machine, which is dis-



tributed in the United States by Kurt Orban Co., Inc., 205 East 42nd Street, Dept. BB, New York 17, N. Y.

The assembly unit not only includes cams for the longitudinal feed of the turret, front and rear cross slides, turret index, collet actuation and stock feeding but also, as standard equipment, trip dogs to change rotation of the work spindle. Both cams and trip dog discs are divided into 100 graduations and the drive rings are designed with 100 serrations to permit rapid and correct settings. Cams and trip dogs are positively locked in place to assure exact size control and accurate timing.

Built to inch dimensions, the B M W is designed throughout to combine high speed production with maximum precision. The short rigid work spindle is mounted in precision anti-friction bearings, belt driven between bearings, and can be run up to 5800 r.p.m. enabling full advantage to be taken of modern cutting tools. The six hole turret and the three cross slides are rigidly constructed and their guide ways are pro-



tected by chip guards. All slides have micrometer adjustment. Collets and cams are interchangeable with American-built equipment.



Because .

Davos Draw Collet Chucks provide such features as these: Increase collet capacity up and above spindle bore; installation and adjustment are easy: precision accuracy; greater adaptability; sure positive gripping action; no stopping for loading or unloading; use standard type draw collets; no special collets needed . . . there is no maintenance . . . working parts are hardened and precision ground of alloy steel . . . costly set-ups for second operations are eliminated. There are many other advantages you should know about . . . so write us today for informative, colorful folder.

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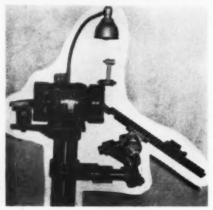
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PINI MFG. CO.

2017 N. HALSTED ST. CHICAGO 14, ILLINOIS

Drill grinder features 1/8" to 21/2" capacity

Recent improvements in the Sterling Model D drill and carbide grinder in-



clude increased capacity to cover all sizes from $\frac{1}{2}$ " to $\frac{2\frac{1}{2}}{2}$ ", according to McDonough Mfg. Co., Dept. BB, Eau Claire, Wis.

This drill grinder does not use collets or chucks. The drill is located against the lip being ground to assure greatest accuracy and the adjustment for drill size is a simple one. The clearance angle may also be easily adjusted as required.

A built-in diamond wheel dresser is standard equipment and another new feature is automatic compensation for wheel wear.

A further advantage claimed is that three lip and four lip core drills may also be ground without any change in the machine or any special fixtures. The necessity of preserving centers in core drills for grinding purposes is eliminated.

Small hole precision drilling in multiple spindle

Announcement is made by the Hamilton Tool Co. 826 S. 9th St., Hamilton, Ohio, that "Hamilton" super-sensitive, small hole, precision drilling machines are now available in single base, mul-

Cemented Carbide

Drilled, Tapped, Threaded, Broached within tolerances of .001 of specifications. Hardest manmade metals accurately machined save thousands of \$\$\$ in all types of tool and die work. Die revisions, corrections machined in hardened state with no material change. All work guaranteed. Write for details.

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Poster SPINDLE ALIGNMENT



On tapping and reaming jobs, the Ziegler Floating Tool Holder speeds the making of set-ups because it automatically compensates for alignment inaccuracies, even though they amount to as much as 1/32" radius or 1/16" diameter.

The man-hours a Ziegler Holder saves will pay for it several times over in a short time.

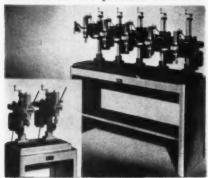
W. M. ZIEGLER TOOL CO. 13570 Auburn, Detroit 23, Mich.



tiple spindle design.

These machines have capacities of .004" to 5/16" hole diameter, clearances up to 8" from center of chuck to column, and up to 14" from base to chuck.

Adjustable stops are provided on all machines for the precision control of



hole depth, and one model features spindle speeds, variable between 840 r.p.m. and 9300 r.p.m., controlled by a graduated hand wheel speed dial. The machines are offered in single base, multiple spindle design. The accurate machining of the continuous base pads make the use of box fixtures feasible.

Air-powered bench vise

Van Products, 3734-48 W. 12th St., Erie, Penn., announces high-powered, air operated bench vises, Models 610-DP and 1000-DP, with power ratio of 100:1. This power is furnished by a compact cylinder with an 8" bore and two pis-



tons of 50 square inches each, separated by a removable cylinder head. The construction is rugged and very simple, requiring only a minimum of lubrication and no adjustment. The packing boxes are equipped with Vi-Speed automatic "U" packers, and the pistons



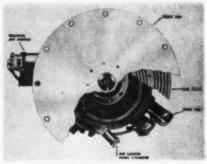
with heavy duty cup seals made of high grade, long-lasting synthetic rubber. The cylinders are single-acting, incorporating a fully enclosed spring return. Piston stroke, and therefore jaw stroke, is 0" to 1%" maximum, controlled by a positive safety stop screw.

Air powered rotary table

An electrically controlled, air powered, rotary index work feeder, that positions work with exceptional accuracy, has been added to the line of controlled-air-power devices manufactured by The Bellows Co., 230 West Market Street, Dept. BB, Akron 9, Ohio.

The table has a 26" diameter table top that is set to index either 6, 9 or 18 stations with repeat index accuracy of .001 on the table top. (Tables with additional positions can be provided on special order.) The table feeds work to and under drill press spindles, milling cutters, arbor and impact press rams, riveting heads, etc., quickly and safely. The operator can load work at one station, unload at another, while work is being done at other stations, thus unloading time from cutting into the productive potential of machine tools. The Bellows Bret-26 index table is

rotated and positioned by a special



3 5/8" bore Bellows air motor complete with a built-in Bellows Electroaire directional valve and speed controls. This air motor develops a pressure stroke of 10 times air line pressure.



Variable speed motor with flexible shaft control

A lightweight Varidrive motor Type 5 VA, in fractional horsepower equipped with mechanical remote control has been developed by U. S. Electrical Motors, Inc., Dept. BB, Box 2058, Los Angeles, Calif. The remote control feature includes a control handwheel with indicator d'al and a five-foot flexible cable so that the machine operator can



control the Varidrive's speed distant from the motor.

An advantage of this control arrangement is that the dial indicator is a part of the control, making it unnecessary to go to the motor to see what speed is being "revved up."

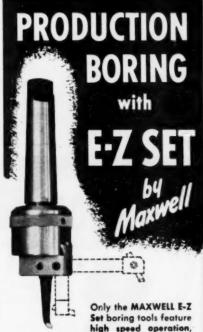
Connecting cable longer than five feet can be used if necessary. Type 5 VA Varidrive has been made available in ¼, 1/3, ½ and ¾ horsepower and in a speed ratio up to 10 to 1 over a range of 4 to 10,000 r.p.m. The entire unit is a one-package motor with the variable speed mechanism enclosed.

Wheel truing attachment

Brown & Sharpe Mfg. Co., Dept. BB, Providence, R. I., announces a radius and tangent wheel truing attachment designed to form, with one continuous movement of the diamond, accurate tangents on either or both sides of the radii.

Convex radii up to ½" with tangents to 5%" in length at any angle, from 90° above horizontal to 20° below, can be formed. Concave radii from 5/32" to 1" (with diamond tool furnished) having tangents up to 5%" long at any angle, from 90° below horizontal to 20° above, can also be formed.

The attachment is firmly clamped to



micrometer-like adjustment to 0.0001inch and maximum boring range.

Interchangeable shanks permit E-Z Set boring tools to be used in turret lathe, jig-bore, milling machine, boring mill, automatic or other machine tools. Because they can be adjusted for cut in only one-tenth the time formerly required by similar tools, these Maxwellmade tools can meet high-speed production on schedules.

E-Z Set boring tools are available in three models having maximum boring bar capacities of ½, 1 and 1½ inches and covering a boring range of from ¾ to 20 inches.

Write today for catalog.



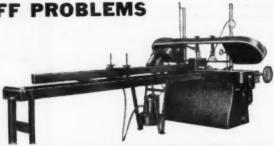
THE MAXWELL COMPANY

380 Broadway . Bedford, Ohio

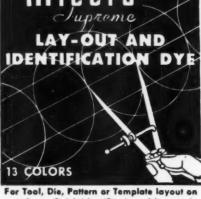
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11/64" x		2.06
3/16" x	12"	2.06
13/64" x	12"	2.19
7/32" x	12"	2.19
15/64" x	12"	2.40
1/4" x	12"	2.40
17/64" x		2.55
9/32" x	12"	2.55
19/64" x	12"	2.75
5/16" x	12"	2.75
	12"	3.11
11/32" x	12"	3.11
23/64" x	12"	3.46
		3.46
25/64" x	12"	3.81
13/32" x	12"	3.81
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29/64" x	12"	4.52
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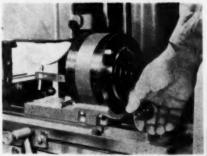
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EASTERN 149 Grand St., New York, N.Y.

the machine table by a single T-bolt. Verniers on the plates and matching scales on the attachment body facilitate

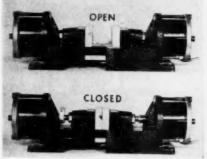


the setting. Moving a single handcrank back and forth gives a continuous motion to the diamond for accurately forming the entire shape.

Black "Centr-Finder" vise

The Black Drill Co., Inc., 1374 E. 222nd Street, Cleveland, Ohio, manufacturers of drilling units and hardsteel drills has developed and now is in production on a new device designed to save time and cut the cost of finding centers on runs of material regardless of shape.

The device consists of two opposed pneumatic cylinders mounted on a cast



iron base with two master jaws at the ends of the rods attached to the pistons. The jaws travel along guides and the movement of both jaws is mechanically synchronized. It operates on five to 100 pounds air pressure depending upon the force wanted at the jaws. The delivered pressure on the work is the

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Check with us first. You'd be amazed how many SPECIAL SIZES are standard drill bushings with us—and how often we can meet special needs right from our shelves. ACE Drill Bushings are specified by discriminating engineers everywhere because these better bushings provide MAXIMUM ACCURACY at the RIGHT price. Order your copy of the new ACE Catalog today.

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For feeding strip and wire coil stock to presses. Coil capacity 300 to 500 lbs. Outside ring dia. 28" to 36". Height of reel, 36". Wheel automatically adjusts parts to suit inside diameter of coils from 11" to 20". Arm allows for quick conversion to horizontal or vertical position and adjusts height of reel.

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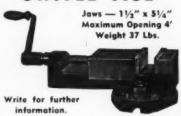


Power feed machinery with adjustable spindles allows many jobs to be handled on one machine. Send skatches of drilling jobs for free estimate.

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NEW BRITAIN

SWIVEL VISE



The body is made of semi-steel; the jaws of tool steel hardened and ground. All working surfaces are ground. The vise is as accurate as is possible and the degrees are cut to very close limits.

NEW BRITAIN TOOL & MFG. CO.

13 HARVARD STREET NEW BRITAIN, CONN., U. S. A. total pressure exerted by both cylinders. Clamping pressures up to 2000 pounds may be obtained.

In operation, the jaw tolerance from the established center line is ± .001" at any dimension of jaw closing, with a working range of 0 to 4".

Automatic air-control valve

Announcement of a new automatic air-control valve, for use with air suction systems and dust collectors on units such as metal grinding and polishing machines, wood jointers, planers,



sanders, table saws, and other similar equipment, is made by the Kindt-Collins Co., Dept. BB, 12653 Elmwood Ave., Cleveland 11, Ohio.

Known as the Ventomatic air control valve, this unit can be fitted to any machine, pipe or installation within its scope. The valve opens and closes automatically as the machine switch is turned on and off. This prevents the continual exhausting of warm air from the room when the machine is not operating, and effects important heating economies.

Spring centered neutral valve

Valvair Corp., 989 Beardsley Ave., Akron 11, Ohio, announces the addition of a new spring centered neutral valve to its regular line of air control valves. Maintenance free operations of over twenty million cycles may be expected from these valves, it is claimed.

In neutral position all ports are blocked. Open neutral position may be furnished upon request. It has three and four way piped exhaust and is



Grand Rapids 8, Michigan



One of the finest and sturdiest height gauges made, the ABENE is the ideal instrument for measuring and scribing off vertical distances, etc., and indispensable in making jigs and fixtures. All parts subject to wear are hardened, including height scale.

0-12" DIMENSIONS

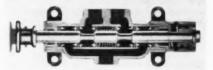
Measuring range 0-12''Length of scribing needle ... 2%'' x1%'' Net weight 3% lbs. Gross weight 5% lbs.

DE WITT EQUIPMENT CO.

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more competitivation and competitive and compe

made in sizes ¼, ¾, ½, ¾ and 1". Styles include knob, lever, foot, clevis, double acting cylinder and double acting



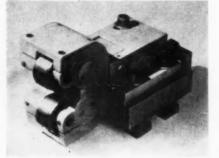
cylinder with solenoid pilot valves. They're controlled by air, water, oil or inert gages up to 300 p.s.i.

The body is bronze with stainless steel stem, hard chrome plated, Hycar "O" ring packers, brass spacers, and cadmium plated springs.

Reed thread rolling attachment

A Reed thread rolling attachment, Series G2A, used in automatic screw machines and turret lathes, that permits threading close to shoulders, is being manufactured by the Reed Rolled Thread Die Co., 237 Chandler, Worcester 2, Mass.

This multi-purpose attachment is of the geared type, and is currently built



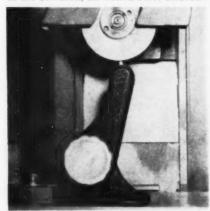
in three standard sizes—½", ¾" and 1". Each size accommodates an infinite range of work within the capacity of the attachment. Other special sizes are available on larger threads.

A precision matching device permits the rolls to be accurately matched by rotating one roll in relation to the other in infinite increments of circular measurements.

Diamond holder has quick adjustment

A diamond holder for surface grinder, cutter grinder and grinding machines, being manufactured by Magic City Machine Tool Co., 2128 Walnut St., Dept. BB, Muncie, Ind., features safety, rigidity and quick adjustment.

Positive locking is claimed because of the serrated, hardened steel diamond



chuck, semi-steel arms and base and aluminum steering and locking hand knob.

High in versatility, the Magic diamond holder may be raised or lowered to suit the work and either inside or outside of a wheel can be trued quickly.

In tests, it is said to save up to 40 minutes a day in continuous grinding operation.

Copyrite hydraulic lathe attachment

A hydraulic copying attachment for application to standard lathes, being introduced by Morton Equipment, Inc., 3 Essex St., Beverly, Mass., is said to handle all types of contour turning as well as screw cutting without dismantling the attachment.

(Illustrations show a typical mounting and examples of profiled work produced by the use of the attachment).

The unit consists mainly of three parts—the copying slide assembly for mounting on the rear of the cross slide; a template or circular master carried on a



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- Specially treated for modern die steels.
- Rapid cutting capacity.
- Large range of standard sizes.
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 .005, .008, .013.

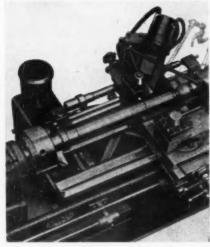
Write for data sheets.

GAMMONS . HOAGLUND CO.

Manufacturers of helical taper pin, chucking, die makers and special reamers.

holder at the rear of the bed; a pump

Where there is a space left on the normal cross slide to take a rear tool post, the hydraulic slide assembly can readily be fitted, and even with a shorter cross slide which is not provided with T-slots, it is often possible to drill and tap the necessary holes. Where the existing cross slide is too short, a slide of sufficient length to accommodate the attachment and the normal front toolpost can be made with little difficulty. The lathe can still be used for



all normal operations without the need for dismantling the attachment. Also all types of contour turning as well as screw cutting can be carried out from



the rear of the cross slide with the tool inverted.

Provision is made, by means of an eccentric screw arrangement for setting



the axis of the T-slotted holder for the flat template, or circular master, parallel with the axis of the lathe, and the holder has fine adjustment along its base for longitudinal positioning. The template holder can be supplied in lengths of 16", 40", 60", 80" and 100".

The possibility of using the first component, produced in the conventional manner, as a master for all subsequent components makes this type of attachment economical when dealing with batches comprising as few as three simple parts. In other instances, the form of a part may be so complicated that it is economical to produce a filed or ground flat template for a single piece. For very large quantities it is, of course, desirable to employ a special hardened and ground master and where the component is excessively bulky or heavy, a 1/8" or 3/16" thick flat template is recommended.

The 45 deg. arrangement of the copying slide permits 90 deg. shoulders to be turned at the tailstock side of the work

and 20 deg. tapers at the headstock side, using the normal feed motion for the saddle traverse. By using a suitable template it is also possible to cut taper threads with a single-point tool.

The normal copying attachment can be used to cut all profiles with a maximum diameter not exceeding the minimum diameter by more than 6". A wide range of lathes can therefore be fitted with this equipment, the only other stipulation being that the main driving motor should not exceed 12 h.p.

Large field of view in profile projector

A profile projector manufactured by Nife Inc., Box 341, Dept. BB, Copiague, Long Island, N. Y., is said to have a larger field of view than most, with an area of screen of 17"x22".

An object can be measured at any point of the screen with an accuracy of about 1-2 v with 100 X magnification and 10-20 v with 10 X magnification. Tools, gages, form cutters, hobs, gear cutters, thread chasers, dies, etc., can be



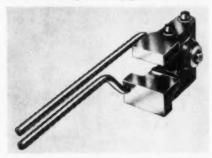
easily and accurately checked.

The magnification is 10 X, 20 X, 50 X, and 100 X. A surface illuminator

lamp on the left side of the instrument gives enough intensity to project surfaces, blind holes and other objects which cannot be studied by means of the profile.

"Mijit" drill jig

A new and even smaller addition to its line of "Mijit" drill jigs is announced



by Esco Engineering Corp., Dept. BB, Detroit, Mich. Called the Jr. Mijit, the new product is designed for accurate



drilling on extremely small parts.

A feature is its self-clamping in any position, using the same handles for locking the part and for locating and holding the fixture under the drill. It is easily adapted to various size parts within its range up to 1½". All working parts, including posts, rack, and gear, are hardened and ground to close limits.

Air hoists improved

Steady improvement is claimed for their air hoists by Keller Tool Co., Dept. BB, Grand Haven, Mich., since their introduction a few years ago. Safety hooks are now standard equipment for the load hook, and optional for the suspension hook.

Other changes that aid in longer service include: The lubrication system



that has been improved; redesign of the brake for smoother, more positive operation; control lever made heavier for rough usage; ring gears hardened; pendent controls available for handling unwieldy loads. Accessories for operating convenience—chain baskets, hose trolleys, I-beam hoist trolleys, etc.—have been made available.

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LINLEY Noiseless Riveting Machines

Sturdy, tast, easily operated! Put your production rivet spinning jobs on Linley Riveting Machines and watch your costs come down.

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Small and Medium

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RIGID - ACCURATE - SAFE

- · Ground micrometer offset screw.
 - Large, easy-to-read graduated dial.
 "V" tool block, hardened, ground.

A model for practically every tool room and production operation.

FLYNN MANUFACTURING CO.

New dresser improves abrasive belt

Faster stock removal, longer belt life, and up to 75% increase in total stock removal during belt life, are the re-



sults claimed for the new Desmond Beltbrasive Dresser, just announced by The Desmond-Stephan Mfg. Co., Dept. BB, Urbana, O.

When contacting abrasive belts in motion, the Beltbrasive dresser cutters remove glazing and loading from the belt and expose more particles for more effective grinding, sanding or polishing results.

Service tests in customers' plants on abrasive belt grinders, sanders, polishers, used for metals and plastics parts indicate that belts last substantially longer.

Canadian-made turret lathes for early delivery

Recently made available for relatively quick delivery in the United States is the CMC No. 34½ turret lathe manufactured by Canada Machinery Corp., Ltd., Galt, Ontario, Canada, represented in the U.S.A. by Pitnam Industrial Products Co., a division of Cement and General Development Corp., 608 Fifth Avenue, Dept. BB, New York 20, N.Y.

The lathe has a 4½-collet capacity and, according to the manufacturer, embodies standard American design and construction practice. The head stock provides twelve spindle speeds from the high-speed drive shaft through alloy



steel heat treated and precision shaved gears. There are sixteen longitudinal feeds to each carriage, ranging from .005 inches to .166 inches per revolution of spindle and sixteen cross feeds to the cross slide carriage, ranging from .0025



inches to .083 inches. Eight feeds are conveniently changed by two levers on each apron while a third lever at the left hand of the machine doubles this range.

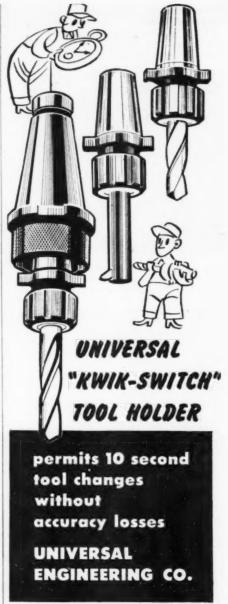
Vacuum line sealing problems solved

Users report that by simply adding 1/64" film or coating of a new plastic gasket material made by the Flexrock Co., 3634 Filbert St., Philadelphia, Pa., to flange faces and gasket surfaces, vacuum line leakage is reduced to a minimum. Any slight leakage which may occur after line has been in service for sometime can be corrected without dismantling flanges by simply applying 1/32" of Plastic Gasket material around the outside surfaces of the flange where they meet with the gasket. This practice can be repeated over and over again. Manufacturer reports material will never harden, making flanges easy to dismantle after years of service.

Carbide cut-off tool

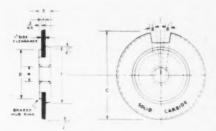
The Gay-Lee Co., Dept. BB, Clawson, Mich., announces that they have been licensed to manufacture and sell a new standard solid carbide cut-off tool for Brown and Sharpe automatic screw machines.

The new tool provides for strong support of the solid carbide blade. The steel hub and carbide blade are brazed to form a single permanently bonded.



FRANKENMUTH 10, MICH.

unit. The Gay-Lee method of holding the carbide assures complete support and minimizes carbide breakage and



parting from the hub, a problem with many designs.

The grind is gashed to provide two cutting edges. This permits cutting off with the top of the work coming or going. Ten standard sizes are stocked. Each is designed for any size bar stock up to the normal capacity of the machine.

"OLIVER" Metal Cutting

For sawing tubing, small rods, sheet metals, woods, hard rubber, compositions.

High speed motor or with low speed geared head motor direct connected to lower wheel.

Cuts straight, circles, curves.

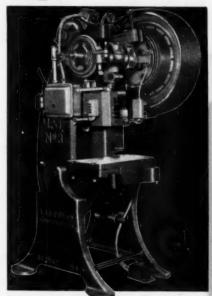
Finest Band Saw of its capacity built.

Write for Bulletin 192-M

Also made in 30", 36", 38" sizes.

OLIVER MACHINERY COMPANY GRAND RAPIDS 2, MICH.

LEJ PRESSES



for Higher Productivity

It is the rigidity and accuracy of L & J Presses that gives them their outstanding reputation. Repeat orders from users is convincing proof of their performance. Put them to work and you'll see output climb. Production will meet exacting specifications—dies will last longer—and only a minimum of routine maintenance will be needed. L & J Presses are made in 12 O.B.I. models—back geared and plain flywheel types—and 8 sizes from 6 to 80 ton capacities. Air clutches optional.

Write for literature



All-steel pillow blocks

A new line of all-steel pillow blocks, providing high load-carrying capacity in a compact and rugged package, has just been announced by the Dodge Mfg. Corp., Mishawaka, Ind.

These new bearings are announced as a joint achievement by Dodge and the Timken Roller Bearing Co., Can-



ton, O. High radial and thrust capacities and the stamina to take heavy-

shock loads have been provided within minimum dimensions and with far less than usual weight.

The bearings are fully self-aligning, with spherical outer race. They are available in both expansion and non-expansion types and have the adapter mounting. Double piston ring seals keep the lubricant in and dirt and dust out of the bearing mechanism. The bearings are sealed both on and off the shaft. They will be provided in shaft sizes from 2-15/16" to 10".

Scully thread wire gage

A 3 wire thread gage has been developed that promises great time saving benefits in measuring pitch diameter, according to Scully Machine Co., 1336 Fairfield Ave., Dept. BB, Bridgeport, Conn.

The Scully thread gage employs the standard wire method of measurement, but simplifies the mechanical operations involved. With this new gage, there is no lost time fumbling with loose wires.

One hand holds and locates the three wires comfortably and quickly. Each

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It's sensational—in price, construction, perfermance. Practically a universal milling machine. Designed for use on any Drill Press or Milling machine. Rout straight or curved, rabbet, drill, sand or mortise. Mill slots, grooves, keyways, squares, hexagons, curves, flats, dovetails, index or laying out work.

Precision made, it permits fine work to close talerances.
Rotary feed is calibrated in degrees; Cross Feed in thousandths. Cross sildes and feeds are 2½° each side of center—4½° overall. Adjustable gibs on cross sildes—40 to 1 worm and gear ratio in rotary feed. 4 Bolt slots—2 Lock screws. Order NOW!

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Mfrs. of PALMGREN PRODUCTS for over 34 years
8384 South Chicago Ave., CHICAGO 17, ILL.

Nicholson Control Valves

SET NEW HIGH in Slow Wearing

Lever, foot, solenoid, motor types for air, gas, steam, oil, water, etc. Size 1/4" to 21/2"; pressure to 5,000 lbs.



discs that become tighter with use, Nicholson control valves are setting records for long wear and leak-free service. Choice of 6 metal combinations to meet specific needs.

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TRAPS · VALVES · FLOATS

gage is calibrated and uses "best wire size" for one pitch. It measures any diameter up to 2½"; tolerance-plus .0000,



minus .0002"; available in the following American standard pitch: 32, 28, 27, 24, 20, 18, 16, 14, 13, 12, 11, 10 threads per inch.

Adjustable prop supports loads up to 10 tons

An adjustable prop for press or die sets is being manufactured by Lemco



Products Inc., Dept. BB, Bedford, Ohio.

The prop consists of a cylindrical ram that is filled with flat steel slugs.

When the ram is lifted, the slugs pour

STOP DUSTS INSTANTLY

with

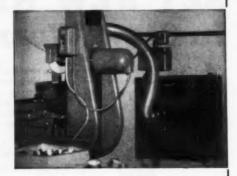
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Available from stock of 22 standard models

300 cfm to 10,000 cfm

Tor: Surface Grinders, Tool and Cutter Grinders; Polishers and Buffers; Abrasive Belts and Discs; Woodworking and Plastic Industry Equipment . . . DUSTKOPS collect almost all kinds of industrial dusts.

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Any Temperature Between 325° and 1800° Maintained Accurately

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Model 2 DeLuxe FURNACE

You couldn't ask for a more dependable furnace for small unit production requiring continuous operation and long hard usage. Accurate control assures you of constant temperatures between 325° and 1800° F . . . always. I.D. 41/4" x 35/6" x 43/4".

110 Volt A. C. Current Consumption 900 Watts.

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Model No.	22	DL	41/ 7		.D.	0.7	Temp, Range 350°-1800°F	Wattage 1600	All Steel
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Model No.	5	DL			3/4" X		300°-1900°F	1750	172.00
Model No.	94	DL	6"	x (B" X	6"	250°-1900°F	2000	200.00
Model No.	10	D.I.	8"	* A	M. A.	Re.	250°-1900°F	2000	213.00

(Also available in stainless steel at slight additional cost)
Write for catalog, illustrating and describing other models

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Manufacturers of Electric Furnaces and Ovens

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All Steel Construction

Stainless Steel

out of an opening and fall into the outer cylinder to form a solid mass of steel on which the ram rests. It supports a load of ten tons. The ram can be returned to original position by turning the Saftprop upside down. The props are made up in standard sizes of 2½"—3%"—5%" and 8" high; and when fully extended they measure respectively: 3%"—5%"—8" and 12" high. The cylinders are welded steel construction.

OTC announces power-twin hydraulic puller unit

A streamlined hydraulic pump and a 50 ton portable Power-Twin ram are the newest additions to the Owatonna Tool Co., Dept. BB, 382 Cedar St., Owatonna, Minn., hydraulic pulling system.

The new pump has several features which make it more efficient, faster and easier to use. A new gauge, calibrated for 50 tons and under, to provide exact tons or pounds pressure when installing bearings and other parts is also available.

The 50 ton Power-Twin ram is the



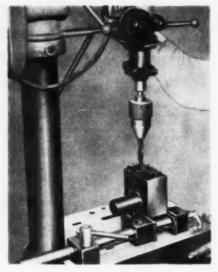
third of a series of hydraulic rams which incorporate a center hole to provide fast adjustment to the work and the use of standard OTC attachments and pullers.

Safety vises for drill presses and band saws

Versatile safety vises, unique in design and flexibility, now extend the usefulness of drill presses and band saws. Manufactured by the Float-Lock Corp., recently acquired subsidiary of American Machine & Foundry Co., 511 5th Ave., Dept. BB, New York, AMF Float-Lock Universal Safety Vises are "full-floating" tools which are said to be applicable to a wide variety of setups in tool rooms and on production and assembly lines.

Easy to mount, the drill press model can be quickly locked in practically any position on the table; clamps, straps and bolts are eliminated. Regular, end or angle drilling can be easily done, and the vise becomes a dependable jig when duplicate pieces are required or repeat assembly operations must be made. The vise turns over on 3 sides for maximum flexibility, and swings completely out of the way when not in use. Maximum capacity is eight inches.

The band saw model, with a 10-inch



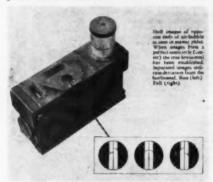
maximum capacity, enables the operator to do all types of sawing without touch-



ing the material. The vise can be used in cutting vertical pieces, compound and simple angles, for irregular shaped, hard-to-hold pieces and for automatic chain feed operation.

Optical level measures inaccuracies to 0.00001"

A newly developed optical level for measuring flatness, straightness and parallelism reads deviations from the



horizontal of 0.00012" per foot of length or 0.00001" per inch of length has been developed by F. T. Griswold Mfg. Co., W. Lancaster Ave., Wayne, Pa. This inherent accuracy makes it possible to check the flatness of surface plates and machine tool beds, the straightness of cylindrical rolls and the parallelism of V-ways or flats to values well within the closest working tolerances. Simply by moving the level along a surface 7" at a time (the length of the instrument) or in shorter increments and by taking a series of readings the entire length of the surface can be checked and plotted on graph paper.

Metal cutting saw

Model 46 metal cutting band saw was announced to the trade this week by R. C. Bluem, president of Tomlee Tool & Engineering Co., 718 Washington Ave. North, Dept. BB, Minneapolis 1, Minn.

The saw is engineered to do everything that saws in a much higher price field will do, within the limits of its 5 3/8" throat capacity. In larger machine shops, this band saw is intended



Simplify assembly, lower spoilage and get better production from this modern Sundstrand Bench Center. You'll check work between centers easier, faster and within limits of .0001" on this improved Sundstrand Bench Center.

"One-hand control" over all movable elements leaves the operator's other hand free to control rotation of the part being checked. Either headstock or tailstock can be unclamped, positioned and locked in place with a single hand operating the top lever. Investigate this bench center today.

Complete Range as Follows:

6" x	18"	12" x	48"	24" x	48"
6" x	36"	12" x	60"	24" >	60"
12" x	36"	12" ×	72"	24" >	72"

FREE Additional Data

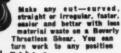


covering complete specifications and additional features is contained in this bulletin. Write for your copy. Ask for data sheet 425



SUNDSTRAND MACHINE TOOL CO. 2535 Eleventh Street, Rockford, Ill., U.S.A.

Cut any Shape... STRAIGHT OR IRREGULAR



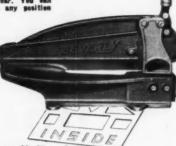
and make a clean cut as you ga. Handles heavy gauges with ease-lighter metals without distortion. 4 models — capacities 18 gauge to 3/16" mild. All Shears equipped with H.C. H.C. Blades for cuting Stainless.

INSIDE SLOTTER

8" Reach - 16 ga. cap.

Makes inside sletting cutting faster, ensier, cleaner. Punch and die arrangement of 5 blades assures accuracy, clean cutting action. Cut 2½ % ½ " clean cutting action. Cut 2½ % 2½ " clean at one stroke. Threat design permits pivoting work at any point in stroke for special inside cuts. Note sample outs at left.

See your Beverly Dealer or write for illustrated catalog.



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- freedom from downtime
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QUEEN CITY grinders & buffers

Compare QUEEN CITY Grinders and Buffers with others costing much more . . . you'll find, as have hundreds of famous plants . . . they give extra value in long life, low maintenance and first cost. All the quality features . . . ball bearings, heavy duty motors, etc. . . . in a complete range of sizes and models. Get the facts. Write for prices and complete details.

QUEEN CITY MACHINE TOOL CO.

235 E. 2nd St.

Cincinnati 2. Ohio



as an auxiliary unit to the large metal cutting machine, so often kept tied up with big work.

A large work table smoothly tilts to 45° and is grooved to take a mitre gauge for angle or compound cuts. The Tomlee is of heavy cast iron construction, ball bearing throughout, operates at four



speeds, and is powered by a 1/2 h.p. motor, furnished as an extra. Included with the saw are a set of guides, a 3/8" blade and an instruction bulletin. Accessories available are an all steel cabinet-stand, mitre gauge and a rip fence.

Buhr special 3-way trunnion machine

Extreme rigidity in the central section and utmost safety through automatic shutting off devices are among the features incorporated in this special 3-way trunnion machine with two horizontal 30"-way hydraulic units and one 8"way hydraulic unit. The machine is a recent development of Buhr Machine Tool Co., Ann Arbor, Mich.

It is said to be able to process 880 rocker arms an hour.

HYBCO TAP GRINDER



MODEL 1100













• Capacities No. 0 Machine Screw to 11/2" Hand Taps.

HENRY P. BOGGIS & CO.

710 East 163rd Street Cleveland 10, Ohio



FOREMOST IN DIAMOND TECHNOLOGY

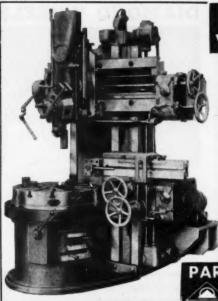






Just alip a tap adapter into the Dahlstrem Tap Guide and twist. Your hand tapping will be quick and ascurate. For machine tapping, the spindle top is center-bored to fit the tailstock center of a lathe. Size 13" x 8" x 14". Includes 9 adapters (8/32 to %"). Taps not furnished. Dailstrom Mfg. Co., 560! Weedlawn Bird., Minneapolis 17, Mins. WRITE FOR PAMPHLET

Dahlstrom TAP GUIDE



36" WEWAG

Arranged for direct V-Belt motor drive, hardened and ground gears, 5-face turret and side head, power rapid traverse to both heads.

PROMPT DELIVERY

Full details will be sent upon request

PARKER MACHINE CO., Inc.
158 PIONEER ST. BROOKLYN 31, N.Y
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HYDRAULIC INDEX TABLE

This table is driven by a fluid motor and is locked in the indexed position by a hydraulically operated shot bolt. The table rides on hardened and ground wear strips, is automatically lubricated, and the table spindle is mounted in heavy-duty tapered roller bearings.

Can be furnished in sizes 30", 36", 42" and 48".





Lee Engineering Company, Inc.
4700 BURLINGAME . DETROIT 4, MICHIGAN



DIAMOND WHEELS



Ralph Watkins International Trade
2252 E. 75th ST. • CHICAGO 49, ILL.

DIAMONDS Dust and Bort

SIZES

ALL



Buck tool has new chuck

A new independent chuck has recently been developed by the Buck Tool Co., 212 Schippers Lane, Kalamazoo, 62, Mich., which eliminates exces-



sive overhang. Built around the spindle and not beyond it, it is claimed to be the first to embody this principle.

The Buck independent chucks are especially designed for lathes from 9" to 16". The new Buck 4-jaw Independent Chucks do away with difficulties of weight.

Their gripping power is accomplished by an operating screw which is a full 1/8" larger in diameter than usual. This provides the extra "hold." The nine pitch Acme threading of these screws makes for finer adjusting, and quicker, easier centering of work.

Power press guard by Searjeant

A basket enclosure type guard has been added to the line of punch press safety guards and accessories manufactured by Searjeant Metal Products, Inc., Box 83, Mendon, N. Y.

Designed for safety requirements of punch presses of all sizes, makes and types, it comes in several sizes, each built to specifications.

The front and side barriers can be tilted in or out as required. The vertical rods can be adjusted up or down



DON'T SCRAP IT!

Ever have a tap or drill break in an expensive part? . . . so that even careful drilling couldn't save it? Today, parts costing as little as 50c can be economically salvaged by an Elox Electron Drill.* They're real money savers! No plant can afford to be without one. Write for particulars.

ELOX CORPORATION

740 N. Rochester Rd. Clawson, Mich. or.M. Bo



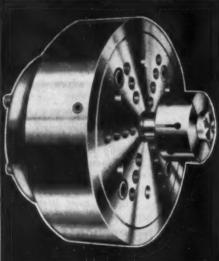
The Wardwell Mfg. Co. 3165 Fulton Rd. Cleveland 9, Ohlo

grinds straight or spiral flutes

ground from solid indexes automatically

Wardwell 90FS is a precision grinder that can produce a variety of special size drills, taps, end mills, etc. often at less cost than from regular supply house. The 90FS is a grinder that no tool and die shop should be without as it can save costly delay when a special drill or tap is needed. Grinding angle up to 45°. Spiral leads as short as 5/16" to one turn. Also sharpens saws in gangs up to 7¾" long.

Write today for full description of 90FS Automatic Universal Flute Grinder



9 Reasons for You to get the Facts on SPEEDGRIP CHUCKS

- 1. They increase production.
- 2. They give greater accuracy.
- 3. Set-up time is shorter.
- 4. They are safer to operate.
- 5. First cost is low.
- 6. Maintenance cost is low.
- 7. Design is simple.
- 8. Guaranteed to do the job.
- 9. Service is prompt.

Speedgrip Chucks will save you money on second operation

WRITE FOR FREE MANUAL



SPEEDGRIP CHUCK

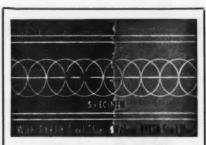
820 N. WARD STREET

to clear the die straps, air nozzles, etc., and the whole front barrier can be tilted up or taken off in a matter of seconds to remove double or damaged blanks from the die.

A clear view front can be supplied and is easy to install in place of some



of the front vertical rods. This enables the press operator to have an unobstructed view of the die and work area.



DYKEM STEEL BLUE STOPS LOSSES making dies & templates

Simply brush on, right at the bench; ready for the layout in a few minutes. The dark blue background makes the scribed layout lines show up in sharp relief, and at the same time prevents metal glare. Increases efficiency and accuracy.

Write for full information

THE DYKEM COMPANY
2301G North 11th St. St. Louis, Mo.

Cranes added to Shaw-Box

Shaw-Box Crane & Hoist Div., Manning, Maxwell & Moore, Inc., Muskegon, Mich., announces a new line of standardized overhead electric traveling cranes of from 1 to 20 tons capacity identified as Series "D" Load Lifter electric traveling cranes. These new cranes are intended to provide



adequate crane service for average industrial requirements. This line does not replace any cranes already in the Shaw-Box line, but supplements it. The new line is made up of three distinct types, each developed for specific requirements that exist throughout industry.



Here's a versatile, handy, accurate surface grinder. Just a few of the uses are: Chip breaker, grinding and sharpening carbide tools, sharpening straight and circular serew mathine form tools, also circular file shiesis, thread chaser and form surface grinder. Prempt Delivery!

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8 N. Jefferson St. Dayton 2, Ohio

ARE YOU AFTER PRECISION?

WHEEL DRESSER is your Answer!

With the aid of standard gauge blocks or adjustable parallels, wheels may be quickly dressed to any angle from 0° to 90° with assurance that the angles will be accurate within plus or minus 10 seconds.

Ruggedly built to withstand everyday shop use, it is a precision tool with bearing surfaces hardened, ground and lapped.



PRICE \$97.50 without diamond Finest quality mounted diamond Is Karest—\$8.50 * % Karest—\$14.00 * 1 Karest—\$20.00

AMERICAN STANDARD COMPANY
Dept. B PLANTSVILLE, CONNECTICUT

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Columbus Die-Tool has been solving tooling problems for over 45 years. Expert designers and builders of all types of tools and special machinery. Write us today!

COLUMBUS DIE-TOOL and Machine Co.

P. O. BOX 750 . COLUMBUS, OHIO





1043 Chateau Street .

Pittsburgh 33, Pa.

RUNS COOL AT 38,000 R.P.M.

Roto-Master Hi-Speed grinder makes carbide roughing and finishing available to every abop. Designed for operations requiring precise "finger-tip" centrel, in conjunction with carbide burrs and mounted wheels from \dot{m} to \dot{k} dia. Operates on 110-120 Velt AC or DC, any cycls.

MAKES CARBIDE ROUGHING AND FINISHING AVAILABLE TO EVERY SHOP

Roto-Master's SUPER COOLING system enables operating speed of 38,000 RPM. Operation requires practically no pressure . . . consequently grinder can be used continuously for hours without heating.

Try Roto-Master in your shop. If not completely satisfied return within 15 days at no charge. If not rated send check or Money Order for \$32.50.

\$32.50

MASTER APPLIANCE MFG. CO., 4th at Ontario, Racine, Wisconsin

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GROBET CHATTERLESS COUNTERSINKS

Six staggered cutting edges give shearing cut that climinates all chatter.

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Hidrand only \$197.50 For Basic Model 350 Model 330-EHB Shown

HYPNEUMAT

HIGH SPEED DRILLING TAPPING UNIT

3.5" Stroke

.375" Drill or Tap Cap. in Steel
May be powered with shop air or low pressure
hydraulics.

LOW COST COMPONENTS FOR

HIGH PRODUCTION DELIVERY FROM STOCK

HYPNEUMAT INC., 647 W. Virginia St., Milwaukee 4, Wisconsin

GATCO ROTARY BUSHINGS

FOR DRILLING, CORE DRILLING ROUGH AND FINISHED BORING The inner race of the GATCO bushing rotates with the tool, piloting the tool accurately below or above the work—or both.

Eliminates expensive tool construction—Reduces tool wear—Prevents seizure and pilot breakage—Especially adapted where precision is required.

Write for full information and prices

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Sensitive Universal

BENCH or FLOOR TYPE RADIAL DRILL

1/2" Drill, cap. speeds up to 3600 RPM
Dist. Spindle to column—21"
Dist. chuck to base—161/2"
Precision Spindle, Ball Bearing Mounted
Rugged Construction, Weight 700 lbs.
Complete Spare Parts Inventory

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Complete with all the features of the regular mechanics' vise plus quick action grip! Accurately machined and quality finished throughout. Special steel jaw plates correctly hardened . . . renewable and interchangeable. Secured by bolts from back of slide and body heads for easy maintenance and interchanging. Swivel Base locks easily by means of two hand levers.



We are the sole U. S. Distributors for WODEN Quick-Acting Vises Also Model 190/7A STEEL BENCH VISE, guaranteed unbreakable! Same fectures as 186 E/7. Steel vise guaranteed; cast iron base not guaranteed.

Model Jaw Jaw Opens 61/4" 53/4" No. Width Depth Weight Price 186 E/7 41/4" 3%" 75 lbs. \$32.50 190/7A 50 lbs. 35.00



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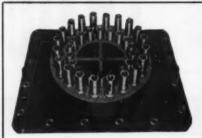
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FOR FASTER, SAFER SOLDERING

The Luma resistance method of soldering is the accepted way for small shops requiring single operation to large plants with many types of operations. Write for complete in-formation about this remarkable tool.

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CUTS, BENDS, PUNCHES

Available in hand or air operated models, the MULTIFORM is shipped complete with full assortment of dies and mandrels te punch, bend and cut round or flat brass, bronze, aluminum, steel, etc., up to $\frac{1}{16} x \times \frac{1}{12} x$ as illustrated, other models up to $\frac{1}{16} x \times \frac{1}{12} x$

RICHARDS CO.

KALAMAZOO, MICH.

Stamps for hand or press

Parker type holder and interchangeable steel number and number and letter sets that promise increased marking versatility and economy have been introduced by The Parker Stamp Works Inc., Dept. BB, Franklin Ave., Hartford, Conn. Flexibility is assured since hand or press stamps for any job, on any material can be easily set in seconds.

An interchangeable threaded shank is included with each set. This allows



changes from hand stamps to press stamps in an instant.

Sets are available in a number of different sizes with varying combinations of numbers or numbers and letters. Each set comes complete with durable hardwood case to facilitate easy, safe storage.

Air-powered 2 station work feeder

Designed to cut in half "idle" machine tool time, a two-station, electrically controlled, air powered work feeder, the "Transfeed" is being added to the line of "controlled-air-power" devices manufactured by The Bellows Co., 230 West Market St., Dept. BB, Akron 9, Ohio.

The "Transfeed" consists of a mov-

The "Transfeed" consists of a movable, mild steel table top 11/16" thick by 5¼" wide by 12" long, which is guided between hardened and ground dovetail ways. Power for the transverse motion of the table top is supplied by a special Bellows BEM 5-60 Air Motor



Cut Costs on Hole-Cutting! USE THE BOREMASTER NEW . . .

Finished holes 1½" to 11¾" diameter to a depth of 8" in one rapid operation on your present equipment!



BOREMASTER is not just another Trepanning Cutter, but a real heavy duty tool. Stock is removed in one piece eliminating waste. Remember . . .

TIME SAVINGS + MATERIAL SAVINGS = COST SAVINGS

Write us today for complete details!

KARL A. NEISE

Mastertools for Modernized Machining 381 4th Ave. Dept. BB, New York 16, N. Y.

ROLL FEEDS

PRECISION FEEDS FOR ALL TYPES OF PRESSES





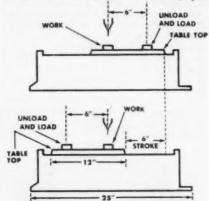
New you can be sure of nonoilp, accurately measured feedlag (in thousandths) on your yuseh presses, either bench or pedestal types. Instantly reversed by merely shifting feed finger spring from one lug to the other! Original satting is maintained as there are noratchets or pawis to wear. Plan to equip your presses with Reil Feeds. Write today for complete list and data.

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ROLL FEEDS CORPORATION

An Electrix Affiliate

with a built-in Electroaire valve that is guaranteed against burn-out, yet



provides instantaneous power control. The work feeder has a 6" transverse positioning stroke, which allows the operator to load and unload work at one end of the table while the machining operation is taking place at the other end.

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ONE PIECE OR ONE MILLION

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because we're geared to work by 3 different

methods — at rock bottom prices.

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STAMPINGS

COMPANY, INC.

8610 UNION STREET, GLENBROOK, CONN.

Grinding fixture for cutter grinding

A new type grinding fixture that handles all types of cutter grinding operations is announced by the Industrial Grinding Co., 1300 W. Magnolia, Burbank, Calif. This new relief grinder will speed up grinding operations as much as 300 percent, it is claimed.

The I-G-C relief grinder's main housing is made of finest grade cast iron which supports a hardened and ground spindle on two large bearing surfaces



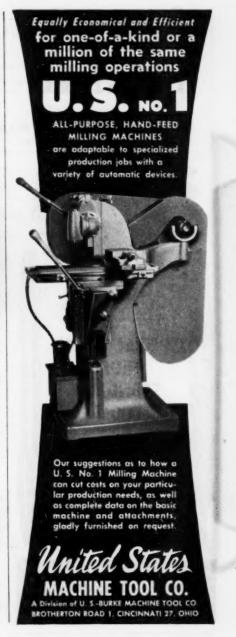
that require only periodic oiling. The cam is hardened tool steel with steel adjustment pins. Fixture swings 90 degrees to the right or left; base is calibrated in five-degree increments.

Developed to handle a wide variety of work, countersinks of all types, center drills, integral pilot cutters, and right or left hand pilot drills, the I-G-C relief grinder operates with speed and accuracy and does not require a highly skilled operator. With only two wrenches, the fixture is easily adjusted for the correct relief and angle in relation to the grinding wheel.

Designed to fit any standard grinder, the I-G-C will handle work from 1/16 inch to 1-inch in diameter with standard collets. The lift of the single cam is variable from .001-inch to ½ inch, and adjustment pins are provided for 1, 2, 3, 4, and 6 fluted cutter grinding.

Swivel caster turn tables

A complete series of swivel caster turn tables, including types for light, medium, and heavy duty service, is announced by Samuel Olson Mfg. Co.,





RUTLAND



FROM STANDARD TOOLS

All types of special reamers, cutters, end mills and drills can be made from standard catalog tools. We can make these specials to your blueprints quickly and economically from our large stock of standard cutting tools.

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Inc., 2423-29 Bloomingdale Ave., Chicago 47, Ill.

The swivel casters permit moving and turning material for a great variety of purposes, such as transfer between con-



veyors or machines, fabrication of sheets, assembly of heavy units, packing, marking, nailing and sealing of large containers, etc.

The width of the caster wheels carries the load. They are of neoprene or other synthetic material for the protection of finished surfaces or of semisteel for other applications.

New contouring attachment on Springfield lathes

An improved, greatly simplified hydraulic contouring attachment with greater sensitivity and accuracy has been developed for Springfield lathes when turning, boring and facing on shafts, axles, rotors and other parts with varying diameters, shoulders, tapers, radii and flanges, according to Springfield Machine Tool Co., Dept BB, Springfield. Ohio

Pilot or control circuits, remote control valves and other troublesome elements have been eliminated and there are no complicated mechanisms or fragile units to cause trouble. Instead, a motor driven hydraulic pump, relief valve and oil reservoir are a single, self-contained power unit which supplies hydraulic pressure to the servovalve and fully universal hydraulic compound rest. A supported and guided adjustable template holder places templates at the front of the lathe where they are most convenient and are in full view of the operator.

In operation, with the carriage or cross slide feed engaged, the stylus



for nut countersinking

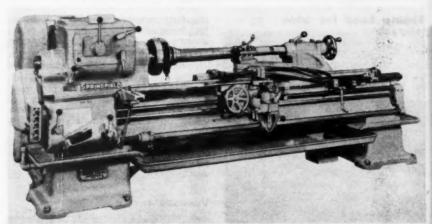
Two KENT machines are available—the smaller for nuts up to 3/4" hexagon—the larger for nuts up to 1-7/16" hexagon.

Hopper fed. Duplicate work spindles countersink both sides of nuts simultaneously giving fast, economical production.

Write for bulletin.

The KENT MACHINE CO., Cuyahoga Falls, O.

Drillers . Threaders . Slatters . Countersinkers . Bar Pointers



scans the full size template. The stylus motion is transferred through the lever arm directly to the servo-valve which meters oil flow to control the hydraulic cylinder. As the piston is stationary on the tool slide, a cylinder movement results in a tool movement and the servo-valve is so sensitive that even the slightest pressure is sufficient to move

the tool.

In addition, Springfield has a simple, electro-mechanical constant cutting speed control. It governs a variable drive and maintains constant cutting speed as the lathe follows a varying contour to give the utmost cutting tool efficiency and uniform finishes throughout its range.



REYNOLDS

MAGAZINE FEED POWER SCREW DRIVING MACHINES

Assembly operations are speeded up and done more efficiently with a Reyselds. Reduses costs too. Illustrated is only one of a complete line of a complete line of a complete line of a complete. When the control of the

AUTOMATIC HOPPER FEEDS

Costly handling operations are aliminated when parts are delivered automatically to work position. Meterized hopper, Parts arranged and fed as required. Send ample of part to be fed when writing for quetation. No obligation.



COOK & CHICK CO.

640 S. MILLER ST.

CHICAGO 7, ILL.

MODEL H . . . AUTOMATIC CHUCKING and INDEXING FIXTURE



1. 1800 light outs per hour.
2. Either herizental or vertical position.
3. Cellets changed instantly.
4. Automatically kneeks piece out.
5. Ratishet or degree indexing-degree indexing added later if desired. Capacity if.
6. Automatic indexer also added later.
Model F—Beth degree & ratinet indexing. Capacity up to 2½°.

Write for Folders

J. W. DEARBORN, Ansonia, Conn.

Gaging head for wide tolerances

A type of gaging head known as the "Plunjet" has been developed by the Sheffield Corp., Dept. BB, Dayton 1, Ohio, for use in conjunction with the Percisionaire and other makes of air



gages for gaging wide tolerance work. It can be adapted to a wide range of applications and is extremely universal in its use. The gaging head is calibrated by a feeler gage having minimum and maximum limit elements. Two types are available, the normal and the reverse, and they may be had in three standard ranges: .040, .020, .010. Plunjets for special ranges and closer tolerances can be supplied on special order.

The "Plunjet" has many advantages, especially for measuring irregular parts.

It is particularly useful for measuring flatness; for general machine shop work such as height gages, squareness and depth checks; in gaging wide tolerances on inside diameters exceeding three inches, and on lathes and other metal removing equipment to tell when the part is reaching the proper size before it is down to the finished dimension.

Vacuum tester

A vacuum tester that's said to be inexpensive and versatile has just been introduced by Gits Bros. Mfg. Co., Dept. BB, 1866 S. Kilbourn Ave., Chicago,

The tester can test countless items, including shaft seals, diaphragms, cylinders, bellows, castings, small fuel tanks, pneumatic valves of all types, manifolds, miscellaneous aircraft parts,



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HIGH SPEED WIRE STRIPPER MOTOR

Instantly and completely removes insulation from solid, stranded or multi-conductor cable up to $\frac{1}{2}$ inch diameter. Stripping length adjustable up to $\frac{1}{2}$ inches. Equipped with $\frac{4}{4}$ H.P., ii0 volt single phase motor including eard, switch and plug.

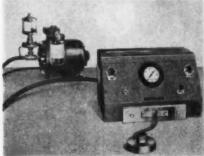
PROMPT DELIVERY \$125.00 f.o.b. Rochester, New York Send for circular. We also manufacture High Speed Cold Riveters, Staking Machines, and Precision Drilling Machines,

THE HIGH SPEED HAMMER CO., INC., 311 Norton St., Rochester 21, New York



magneto parts, plastics, rubber and graphite, etc.

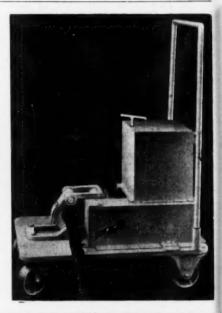
Tests can be run to reveal porosity or surface fissures - or to



lapped surfaces, ground surfaces or surface flatness. The unit can also test effective sealing of complete assemblies and the efficiency of air cylinders.

Motor-driven Hydrashear

An electric motor-driven Hydrashear is now ready for national distribution



AND WORKMANSHIP SUPERIOR QUALITY IN PLUNKET VISES



SQUARE BASE SHAPER VISE

The Shaper Vise has graduated swivel base and tongue in center to fit slot in table, and has holes for bolting down. In ordering this vise give size of slots in Shaper Table, also distance from center

J. E. Plunket Machine Co. 1823 W. Lake St. Chiesee 12. III



New Drill Press Clamp

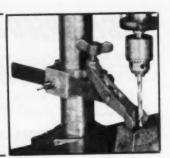
Quickly attached to any 2% column Drill Press.

instantly clamps "work" anyplace on the table surface.

Dealerships Open.

WETZLER CLAMP CO.

43-15-A 11th Street - Long Island City I, New York



by the Pell Cable Cutter Co. of San Francisco, Calif.

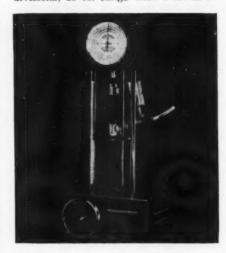
The electric model will cut up to and including 1¾ inch wire rope in 20 seconds. It is powered with a ½ h.p. 110/220 volt, single phase motor-driven hydraulic pump which develops 10,000 pounds pressure per square inch, and can be plugged into any electric circuit. No special wiring is required.

The unit is furnished skid-mounted and is arranged for mounting on either casters or wheels to suit user's convenience. It is compact, approximately 24" long, 15" wide, and weighs approximately 135 lbs.

Low range testing machine

An important new contribution claimed in the field of materials testing, is the Dillon hand-operated multilow range testing machine, made by W. C. Dillon & Co., Inc., 1421 S. Circle Ave., Dept. BB, Forest Park, Chicago, Ill.

This new instrument is available with the following grip clearances: 14¾", 24", 36", and 48". The basic dial is calibrated with four individual scales broken down as follows: 10 lb. range with ½ lb. divisions; 25 lb. range with 1 lb. divi-



sions; 50 lb. range with 2 lb. divisions; 100 lb. range with 5 lb. divisions. A



PINION AND GEAR CUTTING

Machines-

These machines are finished according to the work to be done. Send samples or dimensioned drawings and tell us about the cutting qualities of the material and probable production per week or month. Then wait for our reply with bulletin.

WALTHAM MACHINE WORKS

WALTHAM 54 MASSACHUSETTS MAKE SET-UPS FASTER

Conserve valuable production time by using the fully universal, easily-operated MASTER MULTI-SWIVEL VISE for intricate, angular set-ups in your shop. 3 swivels instantly set any compound angle. Used in shops throughout the world. Interchangeable platen optional. Write for circular.

DONOVAN MFG. CO.

80 BATTERYMARCH ST.

BOSTON, MASS.



supplementary dial is available calibrated for 0-300 lbs. with 1 lb. divisions.

Accuracy is guaranteed to within ½ of 1% to meet ASTM requirements. Overall height of this new instrument is 64". Net weight is 170 lbs.

Illuminated panel meter

International Instruments, Inc., Dept. BB, New Haven, 15, Conn., announces the production of a new 1½" illuminated panel meter. They are available in Model 150, round case, and Model 153, square case, and have external lamp housings.

The difficult problem of illuminating miniature meters has been overcome by integrating the superior qualities of a D'Arsonval type movement with the introduction of a sealed "peep" window in the rear of the case. The small compact movement permits light admitted through the window to pass over the movement and be diffused through a translucent plastic scale. The source of illumination is a miniature aircraft lamp, mounted in a specially designed housing attached to the back of the

instrument case. A lamp is supplied for 6, 14, and 28 volts.

These miniature and sub-miniature



meters are being used extensively in many phases of aircraft and portable electronic and communications equipment.

Graphitic tool steel in hollow die form

A. Milne & Co., New York, N. Y. nationwide distributors of solid and hollow tool steels announces the addition of a new product—Timken Graph-Motool steel in hollow die (tubular) form—to the Milne list of products.

This new product is said to combine

MICR FLAT

Present an absolute continuous bearing surface, finished up to 50 millionths inch. Incredibly smooth. Falling objects do not cause humps. Being harder than hardened steel, can take greatest mistreatment without causing inaccuracy of surface. No oiling Will not rust or warp. No re-scraping. Most durable.

COLLINS MICROFLAT CO., 2326 E. 8TH ST., LOS ANGELES 21, CALIF.

PERFECT PRECISION

Avoid substitutes Immediate delivery in most sizes from 9x12 to 48x144.

REQUEST BULLETIN and name and address of Distributor nearest you.



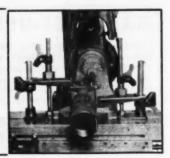


Attention:

- MILLING MACHINES -Heavy Duty Drill Presses Here's a new, fast method to clamp "work". "Speed Clamps" are quickly adjustable from 11/2" to 51/2" Maximum.

Dealerships Open WETZLER CLAMP CO.

43-15-B 11th Street - Long Island City I, New York



all the advantages of graphitic tool steel—faster, easier machining, nongalling, super-wear resistance, with the speed, economy and convenience of the hollow die form.

Improves structural and striking-face box wrenches

Head walls have been reproportioned to improve the efficiency of structural box and offset striking-face box



wrenches made by J. H. Williams & Co., 421 Vulcan St., Buffalo 7, N. Y.

Proportionately thinner head walls permit the use of these wrenches on a broader range of American Standard bolted flanges and flanged couplings. In making this improvement no sacrifice has been made in the useable life of these wrenches.

Blaner spring winder

The Blaner Hand Spring Winder, long manufactured by John Blaner and Blaner Mfg. Co. of Sharon, Penn., has been sold to Blaner Mfg. Div. of Independent Machine Co., Stow, Ohio. Manufacture and sale of the equipment is continuing without interruption.

Cooley heat treating furnace

The Cooley Electric Mfg. Corp., 36 So. Shelby St., Indianapolis, Ind., announces a new addition to its line of heat treating furnaces and ovens.

The VK 6 bench type furnace, made for heat treating to 2000° F, has a larger companion furnace offering the same quality features with dimensions of 10"x6"x18".

The VK-7 has heating elements of 6.5 k.w. capacity, at 220 v. single phase, on all four sides of the chamber and in the door. This provides even heat

IMPROVE FACING OPERATIONS



M-D Facing Head feeds automatically. Lathe tool bit travels radially, from center outward or reverse. 10 sizes 6" to 46" dia. Write for Bulletin, Prices.

On Boring Mills. Drills. Lathes. Millers and Radials

MUMMERT-DIXON CO., 122 Philadelphia St., Hanever, Pa.

You Need an Extra Hand Now to Speed Up Production! HEIMANN TRANSFER SCREW SETS

IN 11 SIZES—No. 6 to 1"
N.C. In all S.A.E. sizes.

Here is the faster, more precise way of transferring open and blind screw holes—make savings in "wage-dollars-per hour" of your expensive hands on every job. A die-and-tool maker's tool with many other applications for die makers and machinists. A set of 6 Hardened Screws nested in combination holder and wrench—no other tools needed. Get more work now—save money tool

HEIMANN MFG., CO. • URBANA, OHIO



distribution and close temperature uniformity. The elements are of the embedded design which protects the

element wire against atmospheric attacks and mechanical breakage.

Diamond wheels imported

The products of Diamant Boart, S. A., Brussels, Belgium, largest European manufacturers of diamond wheels, are now imported into the United States by the Nesen Diamond Tool Corp. of 111 Lake Avenue, Dept. BB, Tuckahoe, New York.

Diamant Boart, S.A. is a manufacturing affiliate of the "Forminiere," leading diamond mining company in the Belgian Congo.

These wheels are guaranteed to be made with virgin boart to the highest standards of workmanship. The diamond abrasive material is said to be uniform in particle size and distribution of grain.

Because the manufacturers of these wheels are not faced with diamond powder shortage a delivery schedule of 8 weeks is assured regardless of quantities involved.

REDUCE DRILL BREAKAGE

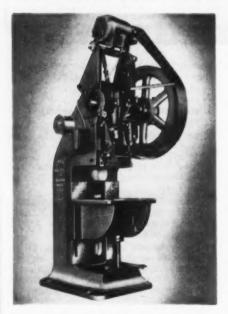
... with full length bearing precision bushings, O.D. ground true to I.D. • We specialize in hole sizes #80 to ½", in any body size. Other sizes to your specifications. Production small hole drilling, our specialty.

Write for catalog and quotations.



Perkins horn press with adjustable bed

Perkins Machine Co., Dept. BB, Warren, Mass., has announced a new horn press No. 556 of 45 tons capacity, with solid or adjustable bed. It has 2½" stroke with maximum adjustment of 7", 38" diameter flywheel, bed area, 22½" x 26", distance from center of slide



to frame, $12\frac{1}{2}$ ", and distance between gibs, $11\frac{1}{2}$ ". The press can be furnished with horn hole and bed can be solid

cast on bed, adjustable or swinging. All working parts are interchangeable with their No. 550B press.

World's smallest grinding wheel

The Chicago Wheel and Mfg. Co., Dept. BB, 1101 W. Monroe, Chicago 7, Ill., manufacturers and originators of the mounted wheel, are now producing what is believed to be the world's smallest commercial mounted wheel, or as they are sometimes known, abrasive point.

Only 1/16" in diameter, these miniature mounted wheels are extensively used for grinding extremely small holes in miniature bearings, bushings, instruments, and for similar precision applications.

Turret lathe for instrument parts

To meet the demand for a small sensitive turret lathe, Louis Levin & Son, Inc., 782 E. Pico Blvd., Dept. BB, Los Angeles 21, Calif., are now delivering a bench turret lathe designed to handle very small parts. It is made with two collet capacities, 3/16" or 5/16". It is equipped with a lever operated collet closer, a double tool cross slide with a swivel compound slide, and a self indexing, six position turret. The bed is 18" long.

The turret head has holes 1/2" in di-



WRITE FOR ILLUSTRATED PAMPHLET

KING OF RADIUS DRESSERS

This economical, independent, one pound radius dresser can be turned as much as 360° to insure a perfect u-shaped radius—1/32° to 7/16° R. Concave and 0° to 5/16° R. Concave and 0° to 5/16° R. Concave on a 7° wheel.
Rear lever diamond-control permits easy adjustment during operation.
Can dress a wheel on top, bottom or in upright position.
Serves as attachment to conventional dressers of upright column type for radii and angles. Any post diamond can be used.

TREFZ MANUFACTURING CO. 4422 N. 6th St., Philadelphia 40, Pa.



ameter. The turret slide is made of hardened steel for accuracy and long wear.

Rotary table features improvements

Features for the new 12" rotary table made by Kenco Mfg. Co., Dept. BB, 5211 Anaheim-Telegraph Road, Los Angeles 22, Calif., include: Eccentric cam which disengages the worm for faster high precision indexing; 734" diameter hold-down ring for added rigidity; table graduated 0 to 360°, dial

graduated in minutes for greater precision indexing; free access to pilot hole from underside, for positive clamping;



holds firmly permitting work on all sides without disturbing setup; four t-slots; all working parts enclosed.



JN COMPRESSED ECONOMY ir-O-chek In machine shop and foundry clear away chips, dust, dirt and surplus material quickly . . . AND SAVE through low initial cost, superior performance, low maintenance. Air-O-chek air guns are of simple de-sign, sturdy construction and are easy to use. AIR-WAY PUMP & EQUIPMENT CO.

Write for full details



SPS drawers can be assembled to fit shop or office space

The Standard Pressed Steel Co., Box 606, Dept. BB, Jenkintown, Pa., has developed welded, all-steel drawer units which, bolted together in scores of combinations, can be tailored to almost any shop or office space.

Made of heavy gauge steel, the drawer units are completely enclosed, can be assembled to stand on the floor, in cabinets, on bench tops, to hang from bench tops, or to be fastened to tool stands and desks.

Drawer units, finished in SPS green. are available in 3 standard sizes: 14 inches wide by 15 inches long by 5 inches deep (SPS number 320-1415): 14 inches by 20 by 5 (320-1420) and 20 inches by 20 by 6 (320-2020).

Quick, ascurate set-ups on lathes, mill-ing machines, grind-ers, etc. Guarantsed accuracy , 6 0 8 5.

Finest normalized Finest normalized cast from. Hardened and ground steel insert with recess for objects with heads. Eccentric counter weights accurate balancing. Capacity 1/6" to 2".

LASSY

WORK HOLDER

Two boits fasten work holder firmly to face plate. \$49.00 f.e.b. Plainville

LASSY TOOL CO., Plainville, Conn.

1054 N. Kilbourn Ave. Chicago 51, III.

Transmission manufacturer cuts assembly costs 50%

Records kept by the Spicer Mfg. Div. of the Dana Corp., Dept. BB, Toledo, Ohio, are said to indicate that a new Buschman roller conveyor system in the plant's transmission assembly department has cut costs approximately 50%. The records covered a period of one year's operation of the new assembly set-up. The manufacturer is E. W. Buschman Co., Clifton & Spring Grove Ave., Cincinnati 32, Ohio.

in former production, the transmissions were assembled on benches and moved between operations on trucks. Now, as previously, production includes transmissions for trucks, buses and automobiles.

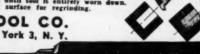
Among the features of the new conveyor which were singled out for comment are a unit turntable in the line and the flexibility of the entire system.



INTERNAL THREADING AND BORING TOOLS

For holes from \(\)" upwards, 15 dif-The accurate thread angle is maintained sharpening until tool is entirely worn down, ang cutting surface for regrinding.

COMET TOOL CO.



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Ever notice how difficult it isin the average catalog - to find EXACTLY the right kind of hand or machine marking device?

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NEW METHOD STEEL STAMPS, Inc. 149 Joseph Campau, Detroit 7, U.S.A.

PORTABLE **ELEVATING TABLE**



Saves and LABOR

Eliminate heavy lifting and cut handling costs. Slight foot pressure varies height up to 151/4", leaving operator's hands free. Table swivels and locks in any position.

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MIDWEST TOOL & ENG. CO. 112 WEBSTER ST., DAYTON, CHIC

PRODUCTION INCREASES with TROYKE ROTARY TABLES





SIZES: 9 - 12 - 15 - 18 - 21 - 25. See your dealer or write for Catalog No. 17, fully illus-trated, showing all models and applications to various work.

Dividing Attachments can be furnished for all models of Worm-



wheel operated Rotary Tables except the Mod-el BH-9.

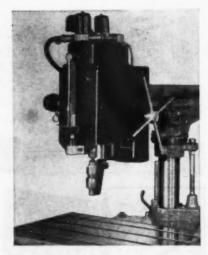
TROYKE MFG. CO. Cincinnati 9, Ohio, U.S.A.

Garvin torque tools measure while in motion

The larger Power-Torque tools being introduced by Garvin Bros., Inc., P.O. Box 536, Dept. BB, South Bend, Ind., are now being used in mounts. Handling 0 to 2760 inch-lbs. (0 to 230 ft. lbs.) in the standard models, custom-made tools can be made for higher torque requirements.

Through the Power-Torque principle all these tools measure torque in motion. This is more accurate than measuring static torque after a part has been driven. Also, by measuring torque in motion it is convenient to torque test pre-loaded bearing assemblies (like in transmissions, steering gears and differentials) on the moving production line.

The MA-500 air driven model is typical of these higher capacity Power-Torque tools. Because the torque range of the larger models exceeds the



strength of an operator, they need to be mounted. The MA-500, illustrated, is mounted on the Walker-Turner radial drill press arms.



CHICAGO . 13 - ILLINOIS

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POWER FEED

A Boring Head That Won't Face Is Not Complete.

Boring, Facing, Turning, Grooving, Undercutting-All in ONE Toolhead

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Muncie, Indiana







STRAIGHT EDGES AND SURFACE PLATES HAND SCRAPED FOR ACCURACY

it's here . . A Willison designed dovetail straight edge to reach the dovetail ways on machine tools. Lighter in weight—less upkeep required—neutralizes the effect of temperature required-changes.

ONLY DOVETAIL of this DESIGN

Vertical ribs and built in suspension pads, combined with a fine slose grain cast iron. Double normalized and accurately hand arraped. Take the guess work out of machine align-ment and let it go to work for you.





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CAMS

complete cam cutting service for both large and small cams is offered by our ROWBOTTOM and DALY cam milling facilities.

May we quote YOU?

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Made in 4 sizes, for hand or me-ter operation.

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INDEPENDENT MACHINE CO. WEST ARNDALE ROAD STOW, OHIO



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Two Sizes

REM The IMPROVED Compound lever ALL ALLOY FULLY GUARANTEED

PORTABLE No. 1 outs up to No. 11 gauge strip or sheet. No. 2 outs up to $\frac{1}{2}$ steel plats.

BREMIL MFG. CO. 1720 Pittsburgh Ave., Erie, Pa.



The simplified PYRO Optical is the ideal instrument for direct temperature readings of ANY heated object in your plant. Completely SELF-CONTAINED. PORTABLE. RUGGED. LIGHT WEIGHT (3½ ibs.) and FOOLPROOF. No correction charts, no accesseries and no maintenance expenses. Unique design permits temperature described on the control of the SMALLEST STREAMS. Write for Catalog No. 88

THE PYROMETER INSTRUMENT CO. New Plant and Lab., Bergenfield 3, N. J.

Accurate Hole Transfer Made Easy With **NIELSEN TRANSFER SCREWS**

Simply insert in holes, invert, strike sharply a



you have centers and drill circles perfectly located.
Reduce time and eliminate spoilage of other methods.
8 sizes, from & to 3/4" U.S.S. Inexpensive - Last for years.

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Steel stamp and dies; roller dies, embossing dies; machine engraving. Dies plates. Write for cat-



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THESE HOLES BY A QUICK, EASY, INEXPENSIVE METHOD Your business letterhead will bring literature WATTS BROS. TOOL WORKS Wilmerding, Pa.

READING BENCH KEYSEATER

Portable directly to Job; a time saver for both small and large shops, 3¼" stroke; a

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KING PORTABLE BRINELL

for all HARDNESS TESTING, Threat 4", Gap 10", Wt. 27 lbs. — ACCURATE

Puts actual load of 3000 KG on 10 mm, ball. Test head removable for testing very large parts.



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REICH 3 - W A Y PRECISION TEST INDICATOR

Lifetime conical bearings, stainless and non-magnetic. Sturdy construction. Needs no service or adjustment. .014" reading.

Price \$7.50

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J. R. Reich Manufacturing Co. 45 E. Stroop Rd. Dayton 9, Ohio



DOUBLE END HG FEET SCREW TYPE JIG FEET PRESS TYPE NA FEET FLANCED NUTS **CUT THREAD STUDS** TEE-NUTS COUPLING NUTS
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THREAD MEASURING MADE EASY WITH NEW 60°THREAD TRIANGLES



Quickly checks all 80° standard and special threads from 4 to 56 pitch . . . ANY O.D. No "fancy" calculations . . just add a constant to O.D. That's

Comes complete with chart SENT ON FREE 10-day TRIAL!

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We solicit your inquiries.

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NEW ROTARY FILE MIX different pes., shank, PPD... \$4.49 14 different pes. 22E as above, ...\$8.79 100 MOUNTED POINTS

\$8.93

SET % and 3/32 shanks, as-21E sorted shapes

sizes.





ROOT COUNTERS

(non-reset type)
A counter for punch
presses, motor RPM. gadget experimenta-tion, etc. 3 digit, tation type ... \$1.49

4-digit,	clock-wise	retat	iem	ŧ	ype	١.	*	\$1.89
5-digit,	ratchet ty	pe						\$2.89



Sizes available—letter size C, fraction size 3/16", num-10, 12, 13, ber sizes 2. 5. 10. 12. 13. 18. 40 & 50. 12 of any one size, dez. \$2.15

12. any mixture of your selection of above sizes.....doz. \$2.35 NOTE: Min. order, I doz. Large quan. available at further discounts.

NEW C	t stone.		steels.	1	pi	a	15	ti	e	8,	1	ŧ	8		
3x yax /a															
3x 10 X 1/4	arbor,	3	pes.												. 27c
4x /cx/a	arbor.	3	pes.												.30c
4x 10 X /4	arbor.	3	pes.												.30c
4x1/0x1/2	arbor.	-	8												. 25e
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TAP HANDLE

No. 6 (5/32" to 3/4" Cap.)

Discounts on quantity



NEW WIRE WHEELS

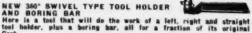
\$2,75

8" dia. x %" ar-bor — arbor ad-justable to larger sizes. One coarse and one fine. These 2 pieces \$2.29



NEW, GEAR BOX TRAIN 6 to 1 gear ratio to two flex shaft outlets: on e la flex shaft included. Unit in-

gears and 7 precision bearings. Many other gear ratios possible. Wt. 10 lbs. PPD: \$6.49 F.O.B. Tulsa



TOOL A takes a 5/16" sq. bit er 5/16" dia. boring tool. \$3.29 Shank size %"x1"x4%", Only

TOOL B takes a %" sq. bit or %" dia. boring tool. Shank Size %"x1 %"x5%". Only

\$3.95 TOOL C: Cut-off blade holder for 3/32"x% blade. Shank size 1/4"x1"x4% (can be changed to fit other size cut-off \$2.25 blades). PPD. Only

TOOL BIT SPECIAL: I doz. H.S. &" sq. x 21/2" new tool bits \$1.95



NEW MF9, 6 H.P. Hydraulic Motor
Unit is compact, powerful. Displaces .507
cu. in. per revolution. 6 gal. per min, at
3000 RPM, 1500 PSI. Positive displacement. Angle type. Rated at 6 H.P. Rotates either direction. Unit can also
a fraction of its new cost of over \$200.

NEW HYDRAULIC MOTOR
Serial No. MF 1071130 B. C. F. 2 Cu. in. Displacement per rev.
378, 3600 R.P.M., 1000 P.S.J. Unit similar to above \$24.50
only smaller displacement and H.P. Only

PESCO HYDRAULIC GEAR TYPE PUMP

Rated at 3 GPM, 3750 RPM, 1500 P.S.1. 1/2" drive spline, Gov't cost over \$9.49





NEW HYDRAULIC VARIABLE DISPLACEMENT PUMP

Unit is used where a varying volume under continuous pressure is desired from a motor pressure generator in a hydraulic circuit, with non-pulsating flow. Pump will deliver maximum volume at any pressure setting will occur. Any pressure setting is made by adjusting regulating screw. Unit has 1100 PSI internal relief valve. Pump housing serves as a reservoir for system and has built-in compressed air supercharger making the system independent of outside atmosphere pressure. Rotation is to the left only, continuous duty RPM 3750, 484 cu. in. per revolution

PUMP AND MOTOR
Pump has i" connections, built-in
relief valve. Adjustable up to 1500
lbs. Max. capacity 6 GPM. 1½
H.P. 24-veit motor. 4000 RPM.
Can be used on 12 or 36 veits. 500
units available at quantity discounts.
Wt. 20 lbs. CLOSE OUT \$9,98



HYDRAULIC CONTROL VALVE

For controlling two single or double action

MONEY-BACK GUARANTEE ON RECEIPT OF MOSE.—ALL merchandise brand new. ALL ITEMS (EXCEPT THOSE SPECIFIED POST PAID) WILL BE SHIPPED F.O.B. TULSA—OR. ADD 10% AND WE WILL SHIP YOUR MOSE. PPD. Writs for FREE Catalog Describing Thousands of Bargain Cutting Tools.

F.O.B. Tulsa

221 W. SECOND

Grinding attachment for Landis chasers

The No. 20 chaser grinding fixture being manufactured by the Landis Machine Co., Dept. BB, Waynesboro, Pa., provides an inexpensive and satisfactory method of grinding Landis tangential chasers, it is claimed. This fixture is used to grind the compound rake

and lead angles.

Supported by the base casting is a crossarm, which is arranged so that the chaser platen can be adjusted vertically. This feature makes possible the grinding of any desired rake angle. The platen can be rotated throughout a 360° circle horizontally thus providing an accurate means of producing the desired lead angle. Knurled knobs, which have pin holes for added leverage, securely hold the fixture in the position in which it is set.

It can be readily adapted for use on any grinding machine which has a traversing table. It can be clamped to a T-slotted table or on a magnetic

chuck.

DO YOU WANT TO KNOW?

The exact size of your Serew Threads, the actual discrepancy of Rejects, how much to allow for Plating, how to avoid Rejects?

Limit or Ring Gauges cannot supply the answer, but the O-Vee Comparator with its patented screw thread measuring principle, will indicate the actual size of a screw without the need for costly set plugs. Used and approved by leading Government Depts., Aircraft & Automotive plants.

Write for descriptive literature

O-VEE CAUCE COMPANY

2516 W. Vernon Ave. Los Angeles 8, Calif.

The No. 20 fixture covers chaser widths from 1¼" to 4¾". This fixture can also be used for chaser widths from ½" to 1¼" by the addition of a grinding block which will be furnished on request.

Magma-Eye for reading micrometer

An improvement in the Magna-Eye for Micrometers, manufactured by Stebar Co., 711 West Lake Street, Minneapolis 8, Minn., is the location of five



beads in the inside of the collar to assure proper fitting to the micrometer, especially those with full finished frames.

Another improvement is the change in the curvature of the magnifying part which makes it easier, quicker and more accurate to read.

Slotted sleeve facilitates tool bit installation

The "Novi" slotted sleeve for simplifying the installation of tool bits in boring bars, tool holders and cutter heads, has recently been placed on the market by Novi Tool & Machine Co., Dept. BB, 43043 Grand River Ave., Novi, Mich.

To install the sleeve in a boring bar, one hole the size of the sleeve is reamed part way through the bar and the sleeve held in place by a pin. If permanent installation is required, the sleeve may be soft soldered or brazed in place.

Two more holes are drilled and tapped, one to hold the tool rigidly in place



and the other as an adjustment behind the tool itself, preventing the tool from sliding away from the work.

The slotted sleeve can be used not only for square tool bits but also for rectangular tool bits. In the latter case, two sleeves are installed with the slots facing each other.

The sleeves are available in sizes for tool bits from \frac{1}{16}" to 1" in width and 1" to 4" in length.

Salvage diamond dust

The Torit Mfg. Co., Dept. BB, 303 Walnut St., St. Paul 2, Minn., manufacturers of dust collectors, announce the successful salvaging of bort and industrial diamonds from dust worn away during the use of diamond-impregnated grinding wheels and diamond-tipped tools used for truing and dressing grinding wheels.

The Torit collector can be installed on individual machines. To collect diamond dusts from machines where diamond wheels are used only intermittently, Torit has developed mobile units mounted on casters.

THE MARKET PLACE

FOR EMPLOYMENT AND SALES SERVICES

DIE & MOLD SALESMEN CAN INCREASE THEIR INCOME

If you sell this field anywhere in New York State, Eastern Pennsylvania, Delaware or Maryland, write us about the new Di-Profiler which sells on demonstration. Attractive commissions. Profitable addition to your present line. Write or telephone today.

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MANUFACTURER'S AGENT WANTED

Now calling on Mill Supply houses in New England States. Should have some knowledge of tool steel for leading line of Ground Flat Stock

Address reply to: BOX BB-109
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SALES SERVICE ENGINEER PUMP DIVISION

by progressive well-known Midwestern manufacturing concern. Must be capable of handling field service problems and preparing layouts for new applications. This is a key position, Qualified replies giving full particulars will be acknowledged. Salary commensurate with experience.

C. H. THOMAS 8 SOUTH MICHIGAN AVE., CHICAGO, ILL. Well established, and well known machine tool sales organization presently selling three major machine tools on a national and local basis seeks one or two additional lines for either nationwide or New York area distribution. Have own engineering, machine tool set-up and repair service, and spare parts departments. Reply, submitting complete details to:

BOX No. BB-107 MACHINE & TOOL BLUE BOOK WHEATON, ILLINOIS

THE MARKET PLACE

(Continued from preceding page)

confidence,

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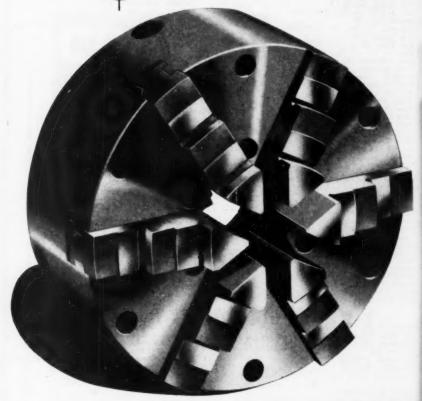
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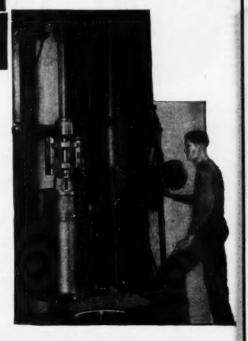
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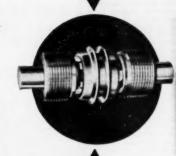
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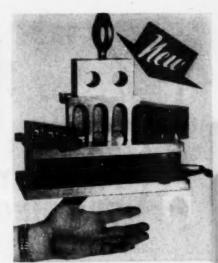
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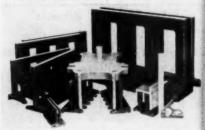
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